GENICOM CORPORATION, WAYNESBORO, VIRGINIA 22980, U.S.A.

The information contained herein does not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to GENICOM Corporation.

GENICOM

GENICOM 510
PRINTER
SERVICE MANUAL
GEK-49375B

Printed January, 1984

PREFACE

This manual provides service instructions for the GENICOM 510 Printer. This printer is referred to as "TermiNet 510 Corresponder" or simply "Corresponder" throughout this manual. Service information covering the optional Automatic Sheet Feeder (ASF) is included in Appendix A at the rear of this manual. Additional information regarding operation and service of the GENICOM 510 Printer may be obtained from the publications listed below.

Operation

Operator's Manual GEK-49374

Automatic Sheet Feeder Operating and Installation Manual GEK-49395

Installation

Automatic Sheet Feeder Operating and Installation Manual GEK-49395

Service

Installation Manual GEK-49373

Parts Manual GEK-49266

Line Printer Service Drawings GEZ-5787

Buffered Parallel Interface Board (HINT) GEK-35997

Unbuffered Parallel Interface Board (CINT) GEK-49271

Serial Closed Loop Buffered (with HINT) or Unbuffered (with CINT) Interface Board (SAUX) GEK-49283

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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CHAPTER 1

INTRODUCTION

GENERAL DESCRIPTION

The TermiNet 510 Corresponder (illustrated in Figure 1-1) is a fully formed character, impact printing line printer. It utilizes the same belt technology employed in other TermiNet belt printers. The TermiNet 510 Corresponder also uses a servo driven paper feeding mechanism. This printer is a pedestal mounted, self-contained unit using a modified USASCII data communications code.

The basic Corresponder incorporates pin feed paper handling only. With the addition of the optional Automatic Sheet Feeder, the Corresponder can handle single sheet paper. Service information applicable to the optional sheet feeder can be found in Appendix A at the rear of this manual.

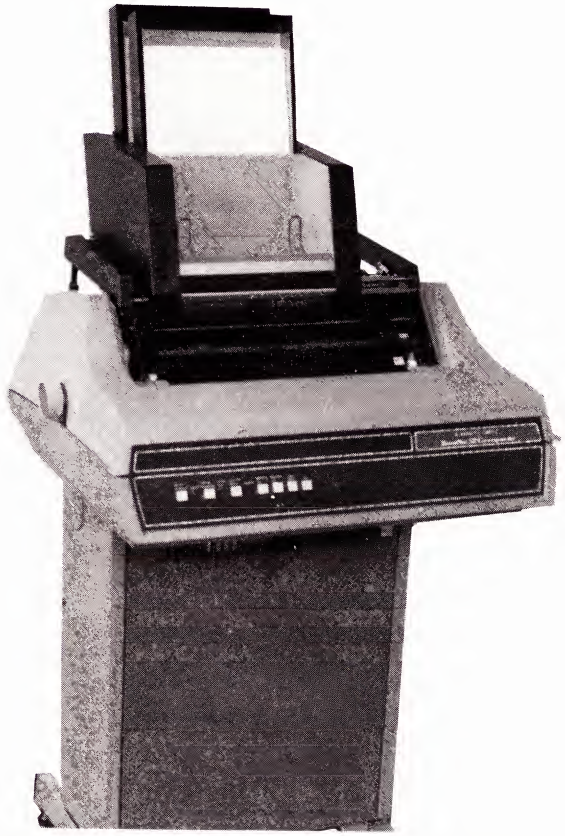
Corresponder design is primarily electronic, with a minimum number of moving parts. The logic rack (bustle) is installed in a pedestal mounted bustle with the main power components located within the Corresponder frame.

PRINT MECHANISM

The Corresponder uses a belt printing concept to achieve its high speed and reliability. A belt carrying print fingers rotates horizontally past a bank of hammers. Each finger has a fully formed type character or symbol embossed on the upper end. There are two complete sets of characters (type fonts) on the belt. Optional three or four font print belts are also available.

Printing takes place by firing a hammer at the correct time to hit the selected print finger to be printed. The print finger is driven against the ribbon and paper to accomplish the printing process. The print finger and hammer rebound back to their correct positions after contacting the platen.

Basic Model for Pin Feed Paper



Corresponder with Optional Automatic Sheet Feeder

Figure 1-1. TermiNet 510 Corresponder

PRINT SYNCHRONIZATION

Precise synchronization permits the belt printing concept to work. The Corresponder electronics compares the positions of the print fingers in front of the hammers. The hammer is fired when the selected print finger is in the correct position. Timing and synchronization of the comparison process is maintained by means of timing pulses. Timing pulses are generated as each print finger passes a photocell; thus, the control logic is continuously informed of the position of the print fingers with respect to the hammers.

ELECTRONIC LOGIC MODULE

The main electronic logic module (bustle) is mounted in the pedestal. The bustle contains large-scale integrated circuits on printed wire boards to provide the necessary circuits for Corresponder operation. The printed wire boards are designed for interchangeability to keep maintenance and service to a minimum. The logic circuits are designed so that most of the basic functions are on one printed wire board. The function of certain printed wire boards can be changed by changing wire straps (see Strapping Options, Chapter 5 — Troubleshooting).

In addition to the pedestal mounted electronic module (bustle), the Corresponder contains one additional printed wire board located on the main frame of the Corresponder. This board provides the power control for the Corresponder and is located under the top cover above the power transformer assembly.

DATA INTERFACE

Data is transferred bit parallel, character serial to the Corresponder from the data source through a 25-pin connector. An optional Serial Interface is also available.

RIBBON SYSTEM

Capability of utilizing the conventional fabric ribbon cartridge and re-inker exists for printing jobs where conventional print quality is adequate. The ribbon system for the correspondence quality mode consists of a single pass film ribbon supplied in a cartridge containing two spools. The ribbon is unwound from a full spool and is rewound onto a takeup spool after passing through the printer. The ribbon is driven in such a way as to produce constant ribbon speed irrespective of spool diameters. To conserve ribbon, the ribbon drive is activated only when printing is in process. Ribbon drive power is provided by the print belt drive motor. An end of ribbon sensor is provided and signals the data source via the low paper sensing circuit. The data source can then intelligently decide to stop printing after the line in process is completed. The operator can change over from the film to the fabric ribbon (or vice versa) in an expedient manner without the use of tools.

FABRIC RIBBON CARTRIDGE

The fabric ink ribbon cartridge contains a 0.75 in. (1.9 cm) wide continuous loop of ribbon configured as a mobius strip. This configuration allows complete use of the entire ribbon area. Whenever ribbon replacement becomes necessary, the entire cartridge may be replaced with a fresh unit.

RE-INKER

An optional re-inker is available for use with the fabric ribbon. The re-inker attaching to the left side of the ribbon cartridge, contains an ink reservoir and wick. The re-inker should be used for refreshing the fabric ink ribbon when printing intensity begins to fade. When the fabric ribbon has been refreshed with a new supply of ink from the re-inker, the operator may remove it until it is needed again.

PRINT CHARACTER SET

The standard two font print belt contains two character sets consisting of 94 print characters including both upper and lower case alphabet.

The optional three or four font print belt contains three or four character sets (fonts) consisting of 64 and 48 print characters respectively (excluding lower case alphabet).

The standard type fonts offered are a modified Courier 10 or Gothic.

CHARACTER SPACING

Horizontal, 10 characters per inch.

PAPER HANDLING

The paper is driven by a DC servo motor. Three line spacings are provided: 4, 6, and 8 lines/inch. These are selected by an operator accessible switch. Paper slew rate is 20 inches/second. Line feed time is 40 ms or less.

For pin feed paper, 6-pin tractors and both rear and front (bottom) insertion is available. With use of the standard fabric ribbon system, the paper can be 1- to 6-parts and 3 to 14-7/8 inches wide.

Single sheets can be accommodated when the optional Automatic Sheet Feeder is supplied.

FORMS POSITIONING

A vernier tractor adjustment is provided to allow precise horizontal positioning of forms in the Corresponder. Forms may be positioned accurately in the vertical position by pushing in and rotating the platen knob in either direction.

VERTICAL FORMAT CONTROL

An electronic form control unit is employed as a standard feature on the Corresponder. Storage of eight vertical formats is accomplished via an electronic memory, with battery back-up. All formats may be programmed by the operator from switches provided on the Corresponder. Form lengths up to 160 lines are permitted for pin feed operation.

PRINT CONTROL

The buffer print memory is loaded at a rate determined by the data source driving the Corresponder interface.

A READY signal from the Corresponder permits the data transfer cycle. The data transfer is terminated by a control signal from the data-source to the Corresponder. The transfer can also be terminated by the Corresponder when a full line of data has been received. Data transfer is expected to require no more than the 25 millisecond line feed period. However, if the data source is slow, a longer transfer period can be accommodated with the resulting reduction in print rate. Printing of the line begins at the completion of the data transfer cycle.

A low belt speed sensor started by the MOTOR ON command prevents printing while the print belt is accelerated up to speed.

PARITY

Straps are provided on the INT board to set the Corresponder logic to check the incoming data for even, odd, or no parity. A parity error symbol will be printed when a parity error is detected.

SPECIFICATIONS

CODE COMPLIANCE

The TermiNet 510 Corresponder conforms to the standard seven bit USASCII code with the exception of those characters that are substituted (see Table 1-1). The eighth bit is reserved for parity (optional). This code is illustrated in Figure 1-2.

b_4	b_3	b_2	b_1	Row ↓ / Column →	0 (0 0 0)	1 (0 0 1)	2 (0 1 0)	3 (0 1 1)	4 (1 0 0)	5 (1 0 1)	6 (1 1 0)	7 (1 1 1)
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	¦
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

MSC-3002

Figure 1-2. American Standard Code for Information Interchange (ASCII) Code Chart

TABLE 1-1
CHARACTER SUBSTITUTIONS

ASCII CHARACTERS	HEX CODE	96 CHAR. SET	64 CHAR. SET	48 CHAR. SET
\	5C	®	®	—
^	5E	©	©	*
`	60	°		
{	7B	§		
¦	7C	¶		
}	7D	†		
~	7E	™		
;	3B			+
<	3C			,
>	3E			.
@	40			$
[	5B			(
]	5D			)
—	5F			/

SIZE AND WEIGHT

Dimensions and weight of the TermiNet 510 Corresponder are as follows:

Width	26.14 in.	(66.4 cm)
Depth (w/o Paper Rack):	21.54 in.	(54.7 cm)
Depth (incl. Paper Rack):	29.32 in.	(74.2 cm)
Depth (incl. Optional Paper Shelf):	35.47 in.	(90.1 cm)
Depth (w/Optional Paper Shelf at Max. Ext.)	37.97 in.	(96.4 cm)
Height (w/o Paper Rack):	36.16 in.	(91.8 cm)
Height (incl. Paper Rack):	37.80 in.	(96.0 cm)
Height (with top open):	48.39 in.	(122.9 cm)
Weight (approximate) (117V):	167 lbs.	(76 kg)
Weight (approximate) (100-240V):	182 lbs.	(83 kg)

ENVIRONMENT

Avoid installing the Corresponder in hot, humid, or dusty areas.

Environmental specifications are as follows:

Termperature

Operating: +32 F (0 C) to +110 F (43.5 C)
Storage: -20 F (-29 C) to +160 F (71 C)

Relative Humidity

Operating: 10% to 95° non-condensing
Storage: 10% to 95° non-condensing

Altitude

Operating: 0 to 12,000 feet (3660 m)
Non-operating: 0 to 50,000 feet (15,260 m)

INPUT POWER

117 ± 10% VAC, single phase, 50 or 60 Hz. Nominal power consumption is:

Models containing the multi-voltage transformer will also accept input voltages of 100, 200, 220, or 240 VAC.

Standby — 90 Watts nominal
Printing — 350 Watts nominal

PRINT LINE LENGTH AND PRINTING SPEED

The chart shown below details typical printing line lengths and speeds of the TermiNet 510 Corresponder.

TABLE 1-2

PRINTING SPEEDS

CHAR/SEC LIMIT	FONTS ON PRINT BELT	AVERAGE LINES PER MINUTE PRINTING SPEED	
		MINIMUM*	MAXIMUM*
510	2	230	240
510	3	230	340
510	4	230	425

*Maximum values are based on an average line density (random printable characters/line) of 127 characters for 2 font, 90 characters for 3 font, and 72 characters for 4 font).

MODEL NUMBER

The model number of the Corresponder is coded to indicate model and options. Figure 1-3 is a chart that illustrates how to interpret the code.

For example, the model number 3S5100AA0000A1 would describe a Corresponder designed to be used with 50/60 Hz, 117 VAC input power, finished in greige and orange paint, containing a 2 font print belt, and having 132 columns. The "0000" in the model number represents a particular group of options installed on the Corresponder at the factory. Finally, the A1 in the model number represents model changes and variations within each model change.

SERIAL NUMBER

The nameplate on the Corresponder frame shows both model number and serial number. The serial number is a 10 digit number broken down as follows:

First two digits	— year of manufacture.
Second two digits	— fiscal week of manufacture.
Fifth digit	— equipment type.
Last five digits	— manufacturing sequence number.

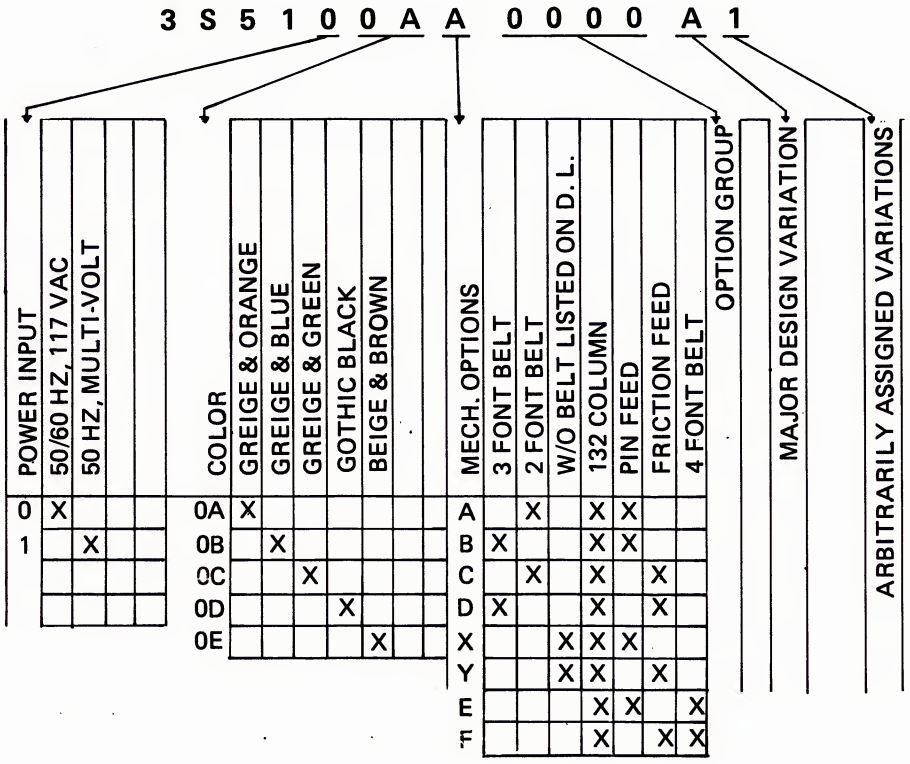


Figure 1-3. TermiNet 510 Corresponder
Model Number Code Chart

CHAPTER 2

INSTALLATION AND CHECKOUT

SECTION 1

INSTALLATION

PREPARATION FOR INSTALLATION

OPERATING AREA PREPARATION

Arrange in advance an appropriate location for the TermiNet 510 Corresponder. A floor area about four feet wide and three feet deep is required to permit cleaning, ventilation, and access to paper handling racks and trays.

NOTE

For installation instructions for the optional Automatic Sheet Feeder, see GEK-49395.

POWER SUPPLY

The TermiNet 510 Corresponder requires 117 volts (± 10%), 50/60 Hz (+1, 1½ Hz). The Corresponder is designed for both 50 and 60 Hz operation.) The nominal power ratings are 90 watts Standby, and 350 watts printing. The power cable is 8-feet (2.44 m) long, three-conductor, with attached grounding type plug.

An AC power outlet supplying correct voltage, current, and frequency must be available within six feet (1.83 m) of the Corresponder. This AC power source must be properly grounded in accordance with recognized good safety practices. In addition to personnel safety considerations, an AC power source not grounded in accordance with recognized good safety practices may cause erroneous equipment operation and could result in damage to the equipment.

NOTE

Read Model Number nameplate on specific equipment (see Chapter 1 for Model and Options coding). Some optional special models operate at different frequencies.

Avoid using circuits serving other devices that may cause chronic low voltage and introduce "noise." Also, avoid circuits serving heavy equipment, whose starting may cause voltage dips and fluctuations.

SYSTEM COMPATIBILITY

Before installation, check that interfacing equipment (computer, parallel interface lines, etc.) is compatible with the TermiNet 510 Corresponder.

EXPENDABLE SUPPLIES

A supply of fuses, ribbon cartridges, paper, forms and other expendables should be kept on hand by the customer.

NOTE

Spare parts, ribbon cartridges, and non-standard items that are supplied by GENICOM Corporation may be ordered from:

GENICOM Corporation
One G. E. Drive
Waynesboro, Virginia 22980-1999.

UNPACKING

SHIPPING MATERIAL

The Corresponder and pedestal are packaged in one shipping carton, together with two accessory parts boxes containing paper handling equipment, an ink ribbon cartridge, cables and instruction manuals. The Corresponder is protected against shipping damage by several molded polyurethane pieces (see Figure 2-1).

If any shipping or handling damage is found upon delivery or during unpacking, immediately notify carrier. If any equipment is missing or incorrect, notify GENICOM Corporation, One G. E. Drive, Waynesboro Virginia 22980-1999 (Telephone 703-949-1000).

UNPACKING INSTRUCTIONS

NOTE

Retain shipping carton and packing material for use in reshipping Corresponder.

1. With shipping carton right side up, cut banding straps around outer carton (Figure 2-1-1).
2. Open top flaps of carton and remove accessory parts box at rear of Corresponder (Figure 2-1-2).
3. Lift up and remove main body of outer shipping carton. This part of carton will fold flat for easy storage (Figure 2-1-3).
4. Remove the two polyurethane supports near top of Corresponder (Figure 2-1-4).
5. Remove accessory parts box located near front of Corresponder (Figure 2-1-5).
6. Remove polyurethane protective pieces from each side of Corresponder (Figure 2-1-6).
7. Remove plastic sheet from around Corresponder and pedestal.
8. Carefully lift Corresponder and pedestal up from bottom part of shipping carton (Figure 2-1-7).

WARNING

CORRESPONDER AND PEDESTAL ASSEMBLY WEIGHS APPROXIMATELY 167 POUNDS (76 KILOGRAMS).

9. Remove power cord, paper handling equipment and other miscellaneous items from the accessory parts boxes.
10. Remove protective paper from under top cover of Corresponder.
11. Cut shipping strap from platen shaft securing platen to main frame.
12. To repackage Corresponder, reverse the order of the steps illustrated in Figure 2-1.

CAUTION

When the Corresponder is being packed for reshipment, the platen should always be secured to the main frame with a shipping strap.

INSTALLATION

With the TermiNet 510 Corresponder removed from its shipping carton, proceed as follows:

1. Place Corresponder on a firm, flat surface in a well-lighted area.

NOTE

Leveling feet on the bottom of the pedestal are preset at the factory. However, if the floor is uneven at the Corresponder location, adjust the leveling feet as necessary to achieve stable support. Locking nuts on the leveling feet must be tightened after adjustment is complete.

2. Raise Corresponder hinged top cover. Lift at ridges on sides of top cover.
3. Make certain that drive belts are in place and routed properly (see Figure 2-2).
4. Check that motor pulley at right rear of Corresponder is correctly installed for input frequency to be used.

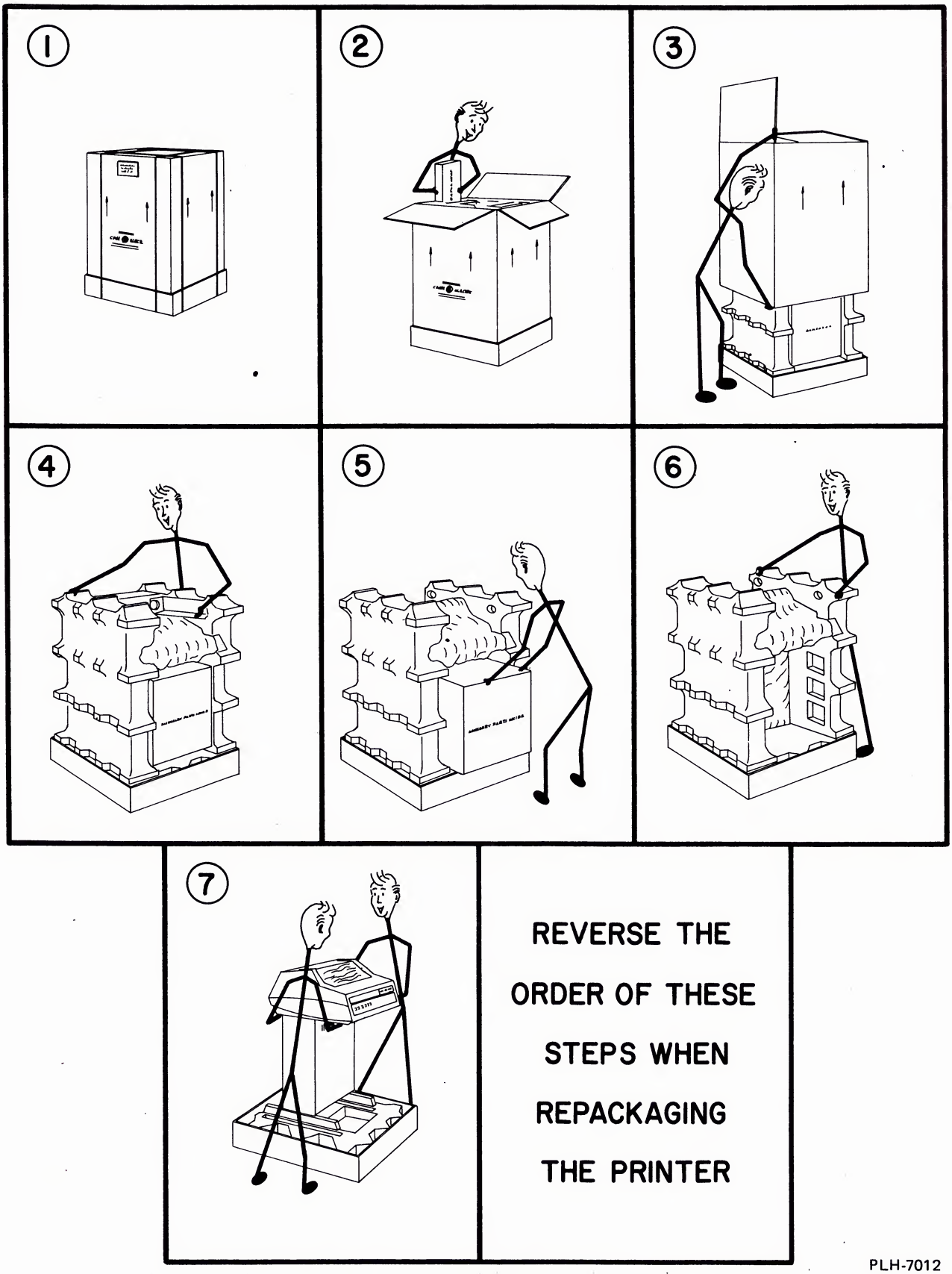


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Figure 2-1. Corresponder Packing Procedure

5. Make certain that print belt turns freely by hand.

6. Install the ink ribbon cartridge per the instructions on the carton.

7. Close the Corresponder cover.

8. Install paper rack assembly on top of Corresponder by hooking the two loops on the rack over the studs located in the top cover flanges.

9. The Corresponder is shipped with a rear low paper sensor installed, but disabled. To enable the rear low paper sensor, should the customer desire the feature, remove the sensor enabling plug (attached to the front bottom left of the Corresponder) from the mounted jack. Conversely, to disable the rear low paper sensor, insert the sensor enabling plug in the jack.

10. The internal cable and jack for an optional front low paper sensor is shipped installed in the Corresponder. If the optional front low paper sensor kit is to be installed, proceed as follows:

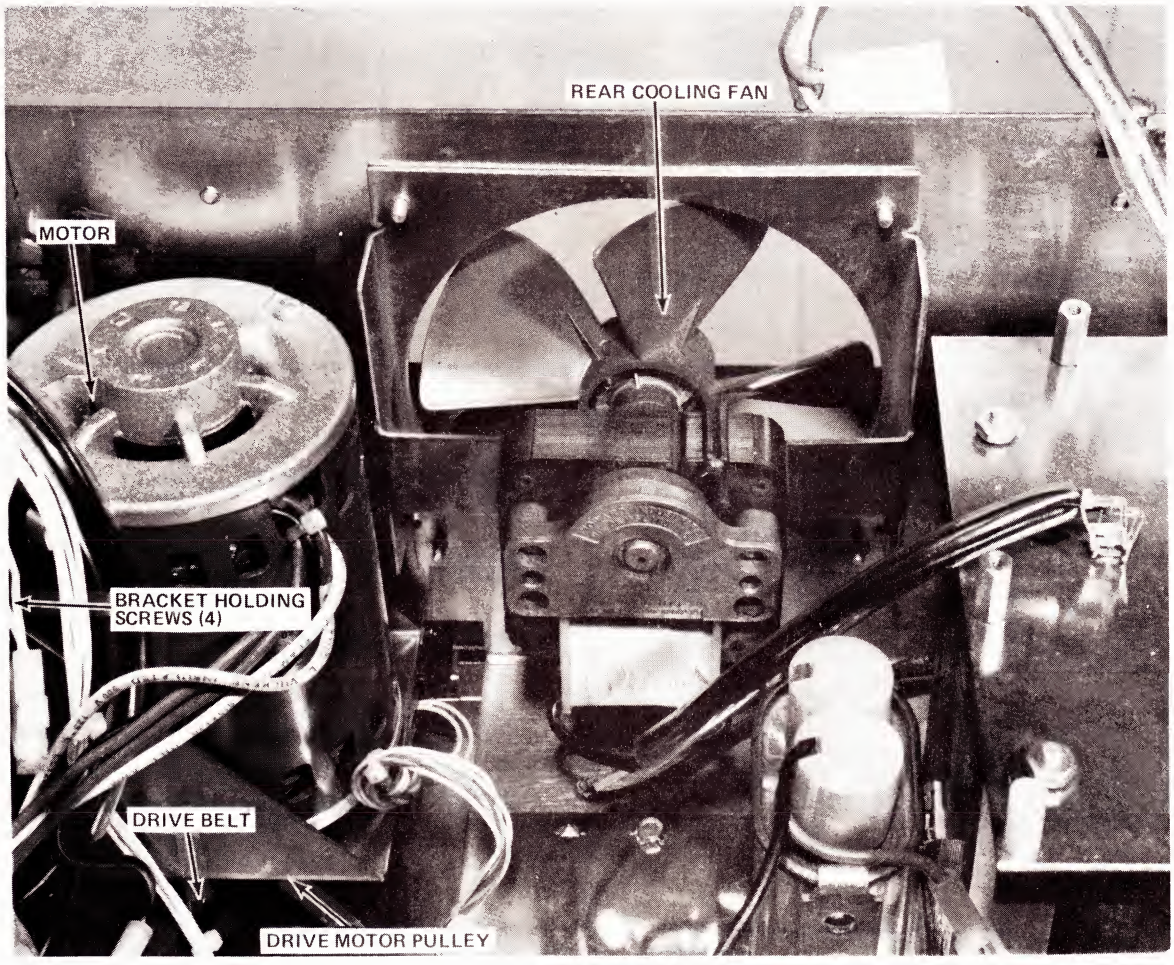

Figure 2-2. Drive Motor Location

799-4-1023

(a) Attach right and left brackets to rod using two No. 8-32 x ¼" pan head screws. (Bracket angles are at outer sides).

(b) Using four No. 8-32 x ¼" pan head screws and four No. 8 flat washers, attach brackets to existing vent slots on front pedestal panel. Use outer left vent slot and fourth vent slot in from right side.

(c) Snap switch and guide assembly onto rod.

(d) Remove the rear low paper sensor enabling plug, if inserted, and connect the front low paper sensor plug in its place.

NOTE

Connecting this plug automatically disables the rear low paper sensor.

11. If applicable, secure optional shelf for paper basket in back of pedestal by hooking it over studs protruding from sides of pedestal.

REVERSAL OF DRIVE MOTOR PULLEY

NOTE

For 60 Hz input power, the smaller diameter side of the pulley must be positioned inboard (next to motor) to drive the belt.

For 50 Hz input power, the larger diameter side of the pulley must be positioned inboard to drive the belt.

If drive motor pulley reversal is necessary to accommodate local power supply, proceed as follows and refer to Figure 2-2.

1. Open top cover.
2. Disconnect AC power.
3. Remove the power supply cover.
4. Disconnect white lead from XRS board, red lead from rear start capacitor terminal, and yellow lead from front start capacitor terminal.
5. Remove four hex head screws and star washer from left side of frame.
6. Lift motor up, tip as necessary to remove drive belt from motor pulley.
7. Loosen the two motor pulley set screws and remove pulley from motor shaft.
8. Reverse pulley, reinstall on shaft, and tighten two motor pulley set screws.
9. Replace motor by reversing steps 1 through 6.

FILM RIBBON CARTRIDGE INSTALLATION

Install the film ribbon deck assembly and ribbon cartridge* (Figure 2-3) as follows:

CAUTION

Corresponder can be damaged by incorrect ribbon cartridge installation.

1. Raise Corresponder top cover.
2. Place RUN/LOAD lever in RUN position.
3. Connect the ribbon motion cable assembly.
4. If necessary, load ribbon cartridge deck assembly onto the locator pins and press down until deck assembly snaps into place.
5. Move the tension release lever to the right and latch it in the tension released position.
6. Install the ribbon cartridge onto the deck assembly by mating the ribbon cartridge tabs to the deck assembly slots.
7. Slide the ribbon cartridge to the left until it is against the ribbon drive wheel.
8. Pull a small quantity of ribbon out of the right side of the ribbon cartridge and route it around the rollers and between the type fingers and platen.

*Part number for one package of five (5) film ribbon cartridges is 44A503463-G01.

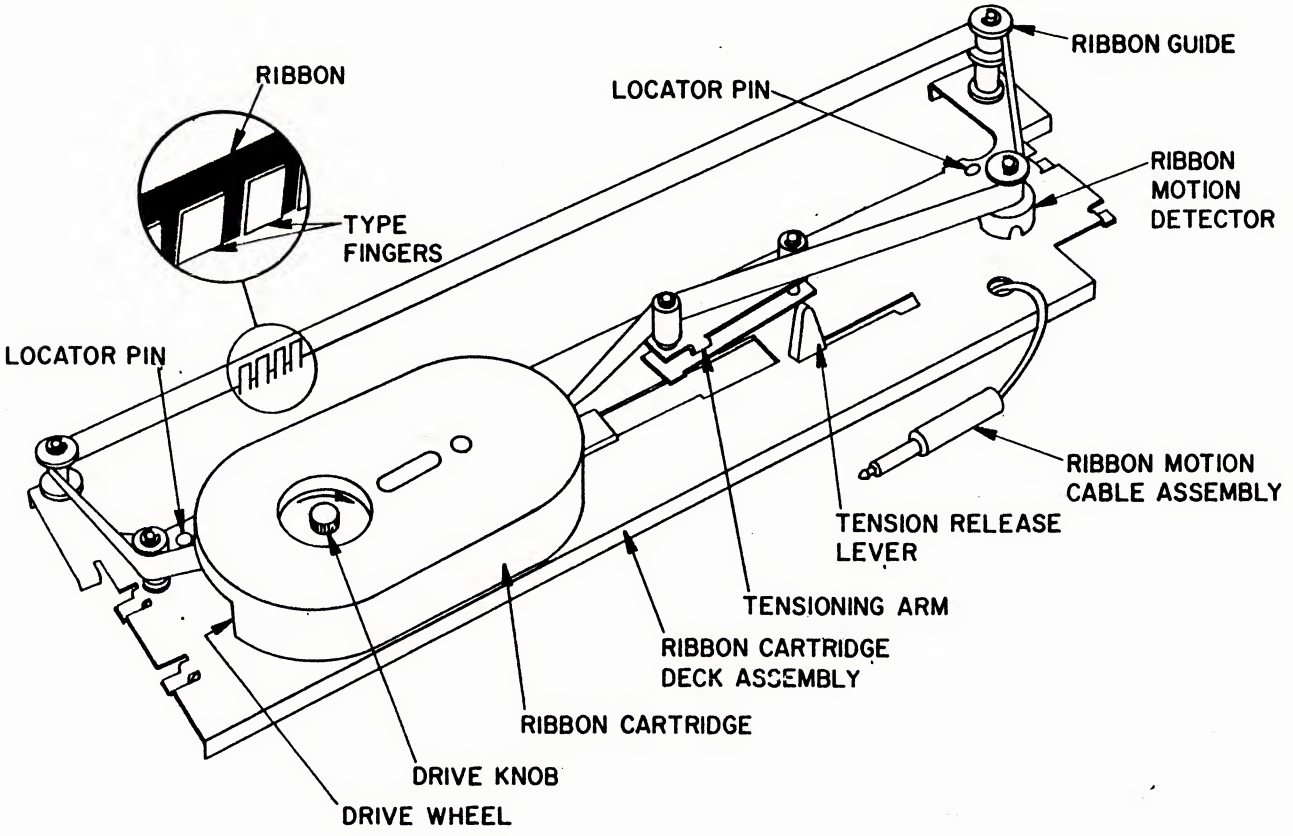

Figure 2-3. Film Ribbon Installation

NOTE

Do not pull out more ribbon than is absolutely necessary.

9. Unlatch the tension release lever to cause tension to be supplied to the cartridge.

10. Rotate the cartridge drive knob to take up any slack in the ribbon.

NOTE

The ribbon in the film ribbon cartridge is a single pass ribbon. Do not advance the ribbon more than is necessary to remove slack. Excessive advancement of the ribbon wastes usable ribbon portions.

11. Manually rotate the print belt one complete revolution to ensure that the ribbon is not caught by a type finger.

12. Close the top cover.

FABRIC RIBBON CARTRIDGE AND RE-INKER INSTALLATION

Install the fabric ribbon cartridge with re-inker (44A419819-G07) or without re-inker (44A419819-G06) as follows (refer to Figure 2-4).

CAUTION

Corresponder can be damaged by incorrect installation.

1. Raise Corresponder top cover.

2. Place RUN/LOAD lever in RUN position.

3. Prior to insertion of fabric ribbon cartridge, rotate drive knob in counterclockwise direction to ensure that ribbon is taut.

4. Load cartridge onto the two locator pins and press down on four corners of cartridge until cartridge clamps snap into place. Rotate cartridge knob clockwise during loading to ensure engagement with drive spindle.

5. Inspect all type fingers to ensure that they are on same side of ribbon as shown.

6. If all type fingers are not on same side, release cartridge clamps, lift off cartridge and repeat steps 3 through 5.

7. Remove ribbon stop from cartridge.

NOTE

To remove a used cartridge, first remove re-inker if one is installed, then release cartridge clamps, and lift off used cartridge as in step 6 above.

8. Install re-inker on cartridge in accordance with Figure 2-5. (Instructions are also on the cartridge box.) Close cover, press MOTOR ON switch, and check for normal movement of type fingers and ribbon.

CAUTION

Remove re-inker immediately if ribbon appears over-inked. Always remove re-inker before removing ink ribbon cartridge or shipping Corresponder. Replace cap tightly over wick before shipping or storing re-inker.

PAPER INSTALLATION

The TermiNet 510 Corresponder prints on single or multiple-part, continuous pin feed, edge

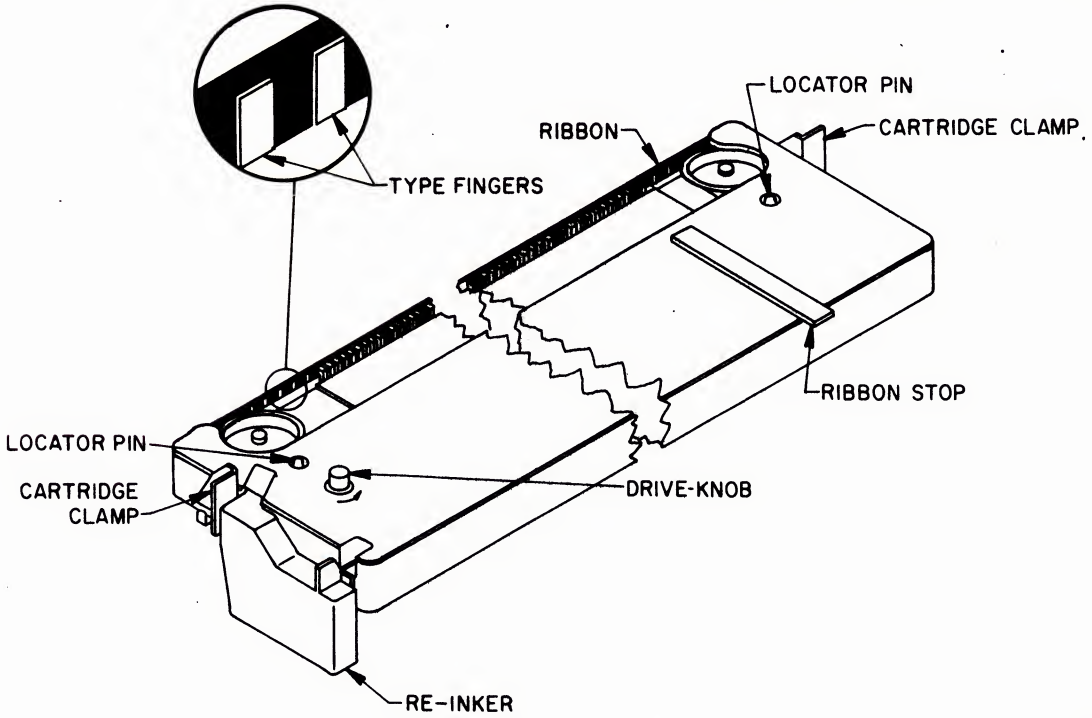

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Figure 2-4. Fabric Ribbon Cartridge Installation

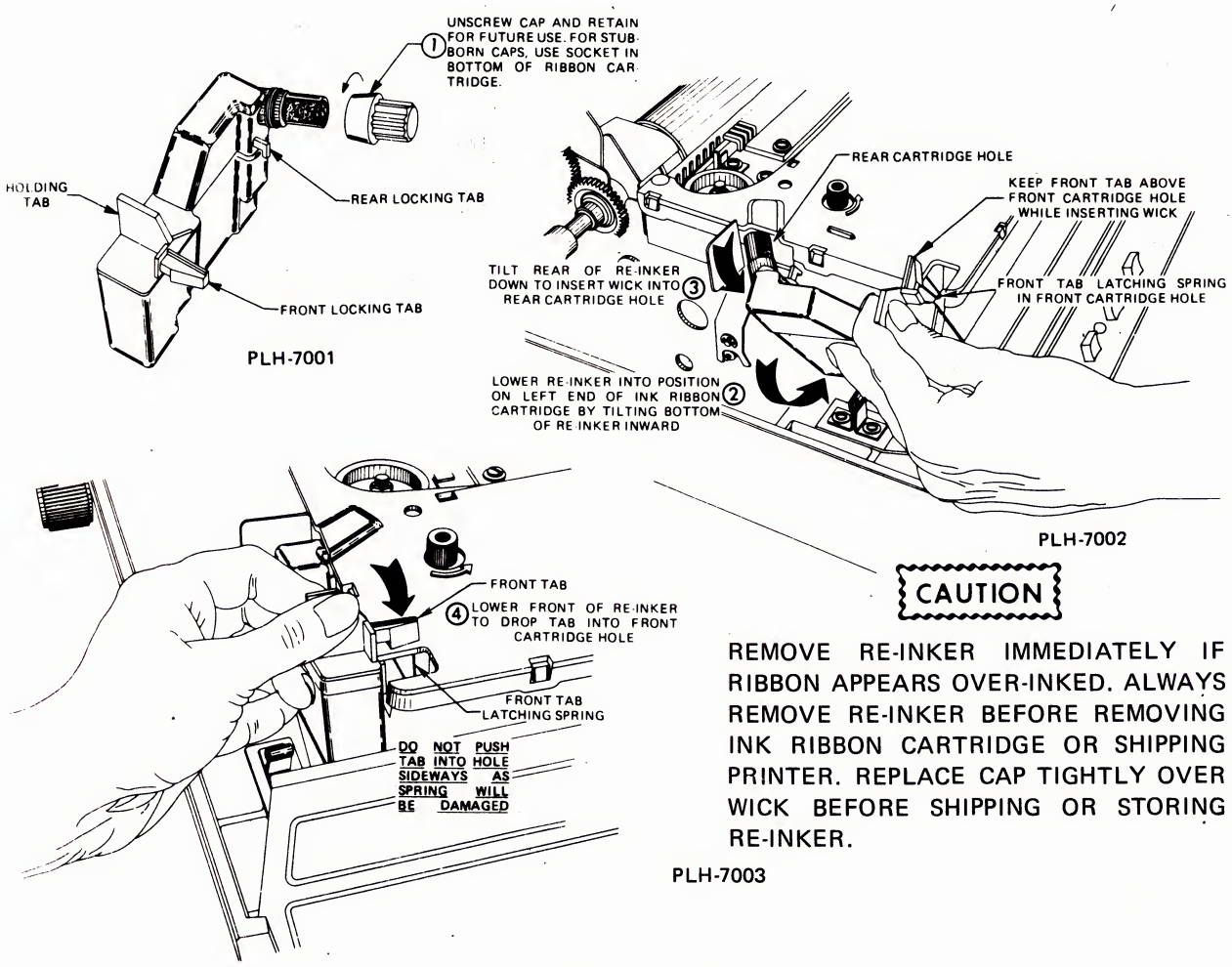

Figure 2-5. Re-inker Installation

punched paper. The tractor is variable to handle paper widths from 3 inches (7.6 cm) to 14.875 inches (37.8 cm). Paper loading may be accomplished from front or rear of the Corresponder as follows (see Figure 2-6):

1. Place paper supply at front or rear of Corresponder as desired.

2. Push paper loading lever down to LOAD position.

3. Feed paper into front or rear of Corresponder. If multiple form sets are used, they should be loaded only into the front of the Corresponder with the shiny side of their carbon paper toward the rear of Corresponder.

NOTE

Be sure paper slides over paper out switch and not beside it, since paper cannot be moved laterally onto the switch.

4. Continue feeding paper until it appears in front of platen. Raise clear plastic paper shield and pull enough paper through to reach beyond tractors. Be sure paper alignment is straight with respect to Corresponder.

5. Release tractors by pushing down on small tractor lever. Slide tractors to left or right as required to align with paper width being used.

6. Install paper on tractor pins, then close tractor covers and lock in place by pushing up on small tractor levers.

7. Push up on RUN/LOAD lever to RUN position.

8. Close clear plastic paper shield.

NOTE

Precise vertical positioning of the form is possible by pushing the platen knob in and slightly rotating the knob in either direction to advance or backup the form as required. Precise horizontal form positioning is accomplished by rotating the thumbwheel located on the right end of the round tie rod extending through the forms tractor.

9. Check that paper is in correct alignment with paper rack on top of Corresponder so that paper can slide smoothly along rack during Corresponder operation.

789-7-1012

REAR

789-7-101

FRONT

Figure 2-6. Corresponder Paper Loading

PREPARATION FOR USE

1. Check that power switch on pedestal is OFF, then check the following:

   a. Correct diameter side of drive motor pulley is being used for the local supply frequency available.

   b. Ink ribbon cartridge and re-inker is installed.

   c. Paper is installed.

NOTE

Since TEST pushbutton operates all 132 columns, be sure that 132 column width paper is used for checkout.

2. Connect or simulate data source, as required.

NOTE

Checkout procedures are provided for applicable interface configurations in the operational checkout procedure.

3. Connect male end of three-conductor power cord to properly grounded 117V AC power source.

SECTION 2

CHECKOUT

This section contains checkout procedures for the TermiNet 510 Corresponder. It also contains information for checking the various Interface Circuits that may be used in different configurations. The chart shown below lists the various Interface Circuits which may be installed in the Corresponder.

TABLE 2-1
CORRESPONDER INTERFACES

INTERFACE NO.	DESCRIPTION
1	Standard Parallel Interface
2	Buffered Parallel Interface
3	Unbuffered Parallel Interface
4	Buffered Closed Loop Serial Interface
5	Unbuffered Closed Loop Serial Interface

CHECKOUT PROCEDURE

1. After completing procedures under PREPARATION FOR USE, press power switch on front of pedestal to ON position. Two fans begin operating (rear of Corresponder and bottom of pedestal).

NOTE

Corresponder will not operate unless top cover is down, paper out switch is activated, and print belt is up to speed.

2. Press MOTOR ON pushbutton. Motor starts, front fan operates, and (on Interface 1 only) MOTOR ON indicator lights.

3. Press TEST pushbutton for approximately 5 seconds. Alphabet, numerals, and symbols test series is printed out in sequential counting order of the ASCII code as long as TEST pushbutton is pressed down. Line feed operates automatically.

4. Press MOTOR OFF pushbutton. Motor stops, front fan stops, and (on Interface 1 only) MOTOR ON indicator goes out.

5. Interfaces 1, 3, and 5 only. Press MOTOR ON pushbutton, as in step 2 above. All Interfaces: Press LINE FEED. On Interfaces 2 and 4, motor starts. On all interfaces, paper advances one line each time the pushbutton is pressed.

6. Tear off paper entering Corresponder at paper perforation nearest point of entry. Use LINE FEED pushbutton to advance paper until low paper condition is sensed. The result of this action varies with the interface arrangement, as follows:

   a. Interface 1: The LPFP signal is switched high at the interface to the Data Source. No direct action is taken by the Corresponder and printing may continue until the paper-out sensor is activated.

   b. Interfaces 2 and 4: Paper out alarm is activated, lighting the ALARM indicator.

   c. Interfaces 3 and 5: PAPER OUT indicator is lit and BUSY signal indicates data cannot be received. Now press FORMS OVERRIDE pushbutton. Paper advances until paper out sensor (below print hammers) is activated (or until in-process form is completed as sensed by the VFU).

7. Reinstall paper. ALARM indicator or PAPER OUT indicator goes out, as applicable. Press MOTOR ON pushbutton. Where applicable, motor starts. Then press LINE FEED pushbutton several times. Paper advances one line at a time, as at the end of step 5 above.

8. Interfaces 2 and 4 only: Press ON LINE pushbutton. ON LINE indicator lights and Corresponder goes into an On-Line condition, ready to accept data from data source.

9. Interfaces 2 and 4 only: Press LOCAL pushbutton. ON LINE indicator goes out and Corresponder goes into a local condition, unable to accept data from data source.

10. Interfaces 3 and 5 only: Press SELECT pushbutton several times. This alternately sets and

resets a flip-flop controlling the SLCT signal. When in the set condition (signal at high level, Corresponder in selected or ready condition), SELECT indicator is lit. When in the reset condition (signal at low level, Corresponder unable to receive data), SELECT indicator goes out.

VFU TEST

11. Install supply of user's forms in Corresponder.

12. Lift Corresponder top cover. Select channel on VFU that corresponds to the form being used (channel 1-8). Close Corresponder top cover.

NOTE

For VFU channel programming instructions and VFU operating instructions, see TermiNet 510 Corresponder Operator's Manual, GEK-49374 and Chapter 3 of this manual.

13. For Interfaces 1, 3, and 5 only: Press MOTOR ON pushbutton. Motor starts and, on Interface 1 only, MOTOR ON indicator lights.

14. Press FORM FEED pushbutton (Interfaces 1, 2, and 4) or TOP OF FORM pushbutton (Interfaces 3 and 5). This advances the paper to the top of the next user's form.

NOTE

Steps 15-20 require that customer's data source be connected to Corresponder.

15. Select the proper VFU channel (1-8), input data from user's data source and print out information on forms. Data should print out correctly. (If form aligns incorrectly with data, check channel program for error.)

16. For Interface 3 and 5 only: Tear off form entering Corresponder at form perforation nearest point of entry. Press TOP OF FORM pushbutton. Form advances only until it reaches appropriate (i.e., front or rear) low paper sensor. Press FORMS OVERRIDE pushbutton. In-process form will complete its printout, then Corresponder will stop.

17. Repeat step 7.

ADDITIONAL OPERATIONAL CHECKOUT INFORMATION

18. Interfaces 1, 2, and 4 only: READY indicator is lit by data source as required to signal the operator. For Interface 1, the READY indicator is lit when the RTP signal is held at a high level; for Interfaces 2 and 4, the READY indicator is lit when the RTP signal is held at a low level.

19. Interface 1 only: INTERRUPT pushbutton, when pressed, provides a high level signal at the interface to the data source, as required. The Corresponder logic does not respond to this pushbutton.

20. Interface 1 only: HERE IS pushbutton, when pressed, provides a high level signal at the interface to the data source, as required. The Corresponder logic does not respond to this pushbutton.

21. All Interfaces: Turn power switch on front of pedestal to OFF position. Motor and all three fans cease operation. Corresponder is inoperative.

WARNING

Always disconnect main power cord from local supply before removing pedestal panels.

OPERATOR INSTRUCTION

Instruct operator in the following:

1. Use of front panel pushbuttons.

2. Changing of paper, film ribbon cartridge and fabric ribbon cartridge with re-inker.

3. Use of VFU for printing forms.

4. Procedure for replacing print fingers.

CHAPTER 3

OPERATION

Detailed operation procedures that depict all user phases of the Corresponder operation are included in publication GEK-49374, TermiNet 510 Corresponder Operator's Manual. For detailed operating instructions for the Corresponder when the optional Automatic Sheet Feeder is installed, refer to GEK-49395. This chapter provides control function information to help familiarize the service technician with the operation and function of the front panel switches.

CAUTION

Do not operate the Corresponder without a ribbon cartridge installed, as excessive print finger wear may result.

Failure to observe this caution will void Corresponder warranty.

SWITCHES AND INDICATORS

Operating power is supplied to the Corresponder through a pedestal-mounted switch. The location of this switch is shown in Figure 3-1.

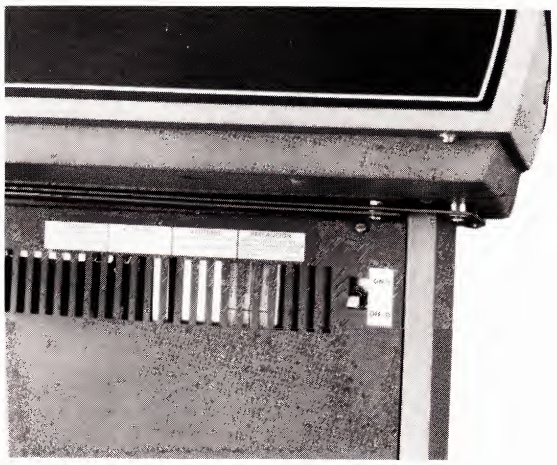

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Figure 3-1. Power On Switch

Depending upon the interface printed wiring board being employed in the Corresponder, the function of the front panel switches and indicators differ. Figure 3-2 illustrates the standard TermiNet 510 Corresponder front panel switch and indicator functions.

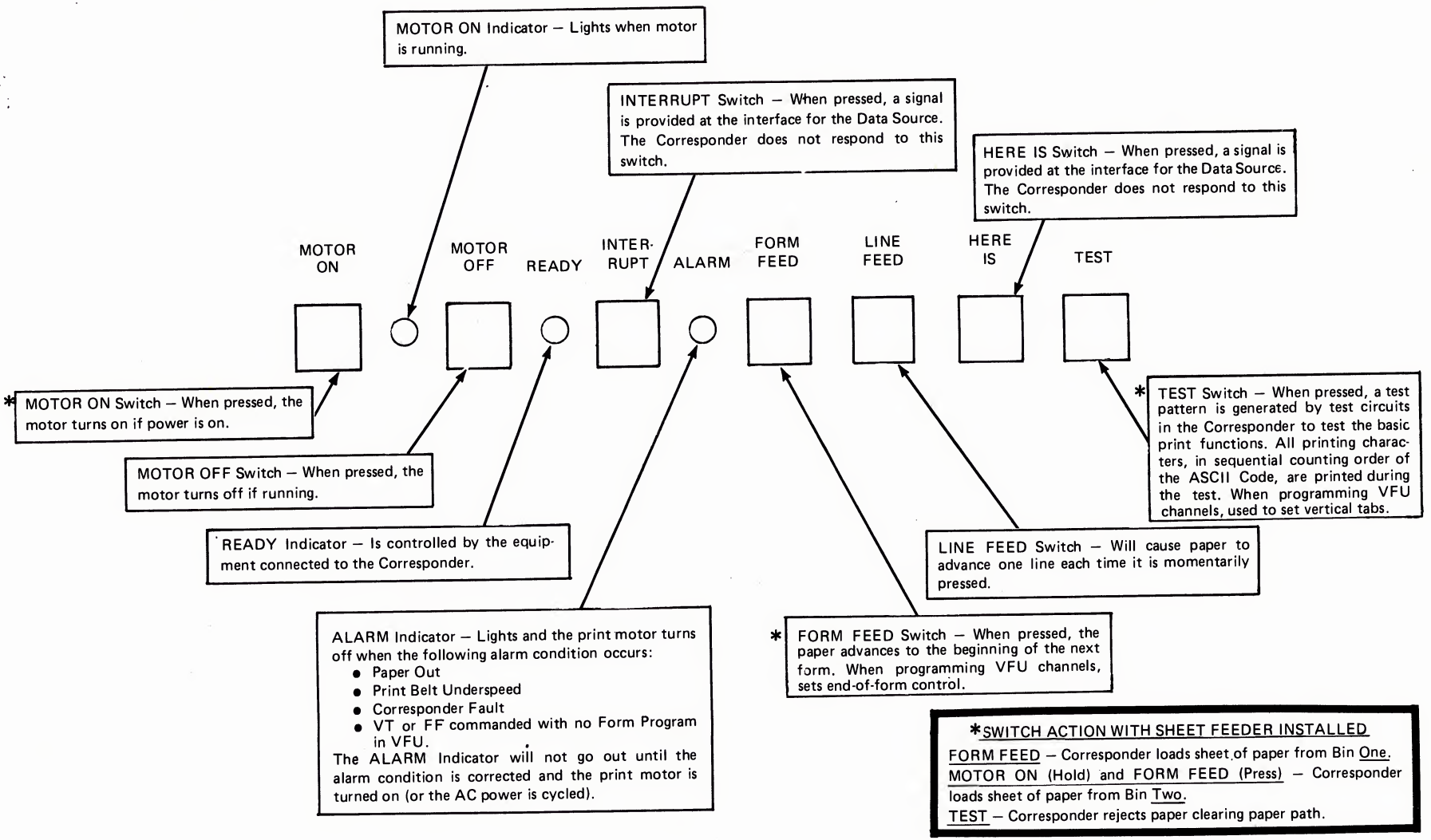

Figure 3-2. Standard TermiNet 510 Corresponder Front Panel Functions

VERTICAL FORMAT CONTROL

NOTE

When the Automatic Sheet Feeder is employed, FF and VT codes are used by the Corresponder for controlling paper loading. This prevents use of the Vertical Format Control when operating in the sheet feed mode.

The TermiNet 510 Corresponder allows an operator to store eight different vertical form formats (eight channels) in a battery backup electronic memory. Vertical format programming is accomplished using the front control panel switches (Figure 3-2) and vertical format unit switches (Figure 3-3) and cannot be performed from a remote on-line source. To program a vertical format channel, perform the following steps:

1. Turn the Corresponder motor off (Figure 3-2).
2. Install the form to be formatted into the Corresponder and align the top-of-form with the current print line.

NOTE

When the Corresponder motor is off, the platen knob can be used for adjusting vertical paper position.

3. Open the top cover.
4. Set the vertical format unit RUN/LOAD switch in the LOAD position (Figure 3-3).
5. Set the channel select switch (Figure 3-3) in the channel position (1-8) to be used.
6. Close the top cover.
7. Turn Corresponder motor on (Figure 3-2).

NOTE

In the following steps, the Corresponder front panel TEST pushbutton is used to set vertical tabs, and the FORM FEED pushbutton sets the end-of-form control.

8. With the top-of-form aligned properly, press the FORM FEED pushbutton and then press the LINE FEED pushbutton. Next, advance the form one line at a time using the LINE FEED pushubtton. When a desired vertical tab location is reached, press the TEST pushbutton to program the tab point (Figure 3-2).
9. Continue Step 8 until the top of the next form location is positioned at the current print line.
10. Press the FORM FEED pushbutton (Figure 3-2).
11. Raise the top cover and set the vertical format unit RUN/LOAD switch in the RUN position (Figure 3-3).
12. Close top cover.
13. The VFU channel is now programmed.

With the correct form installed, and the proper vertical format channel selected, vertical tabulation during printing is activated by VT codes, and form feeding is activated by FF codes.

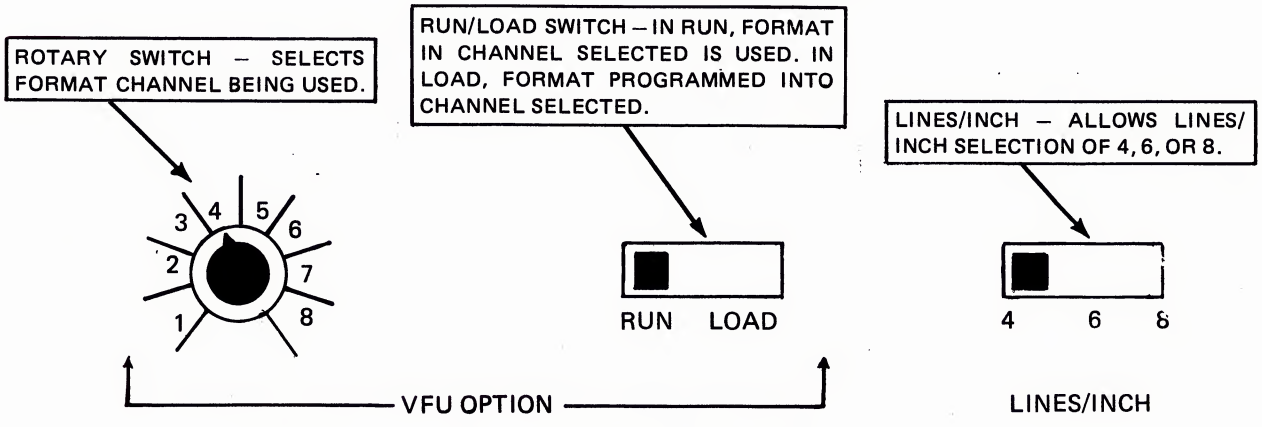

Figure 3-3. Vertical Format Unit Panel Functions

CHAPTER 4

PRINCIPLES OF OPERATION

SECTION 1

CORRESPONDER DESCRIPTION

FUNCTIONAL DESCRIPTION
(Figure 4-1)

GENERAL

The TermiNet 510 Corresponder is capable of printing 340 lines of data per minute. The Corresponder uses a modified 7-bit USASCII code. Each full line of incoming data from the data source is buffered and then printed during one font time (i.e., the length of time required for one complete font of print fingers to pass a given column). Data is transferred from the source to the buffer during paper movement so all available time is used for printing.

The Corresponder control system can be made compatible with a variety of data processors and communications buffers. The Corresponder interface is designed for operation in either a system in which the Corresponder controls timing of data transfer or the data source (processor) controls all timing.

NOTE

Although the following description is intended to cover only one particular type of interface, many of the operating characteristics between the different types are similar.

INTERFACE

When the Corresponder is in the load condition (i.e., is ready to accept data), data is transferred in parallel bit fashion, character serial, from the data source through the Corresponder interface (INT board) to the print memory located on the LOG board. When a full line of characters has been transmitted, a transfer signal from the interface causes the print sequence to begin. At this time, the interface signals the data source that the Corresponder is busy printing. A new line of data cannot be received until the old line is completely printed. After the data line has been printed, the interface signals the data source that the Corresponder can again accept one line of data. The INT board then acts as a data flow regulator.

Another function of the INT board is to decode the first character (last character in certain systems) of each data line. This 7-bit non-USASCII code character is a paper feed code that initiates the LF, VT, or FF paper feed commands.

As each printable character is received at the INT board, it is checked for correct parity. If an error is detected in a character being processed, the INT board will cause a double underline character to be printed in place of the character having the incorrect parity (strapping option).

Data is presented to the INT board from the data source over data lines D1 to D8. This data is strobed in by a 2 µs strobe pulse. The maximum instantaneous transfer rate is 60,000 cps. An ACK signal is sent to the data source by the INT board each time a character has been strobed into memory. This is for data sources using a closed loop by character system. Other systems may not employ the ACK signal.

The data source must be able to recognize the state of the interface signal RFP (Ready from Printer) which is used to signal the data source whether or not the Corresponder can accept more data. After each line of data is sent to the Corresponder, the data source should generate the signal TRAN (Transfer). If the data source does not have the capability to generate a TRAN signal, but just scans RFP as a go-no go status, then the Corresponder can internally generate a substitute for TRAN. The RFP signal is also used to alert the data source as to several status conditions in the Corresponder such as Alarm, Low Voltage, and Test.

Other interface signals used on the INT board are Answerback, Bell, Frame Ground, Interrupt, Low Paper, Motor Off, Motor On, Motor-Or-Feeding, Power On, and Signal Ground.

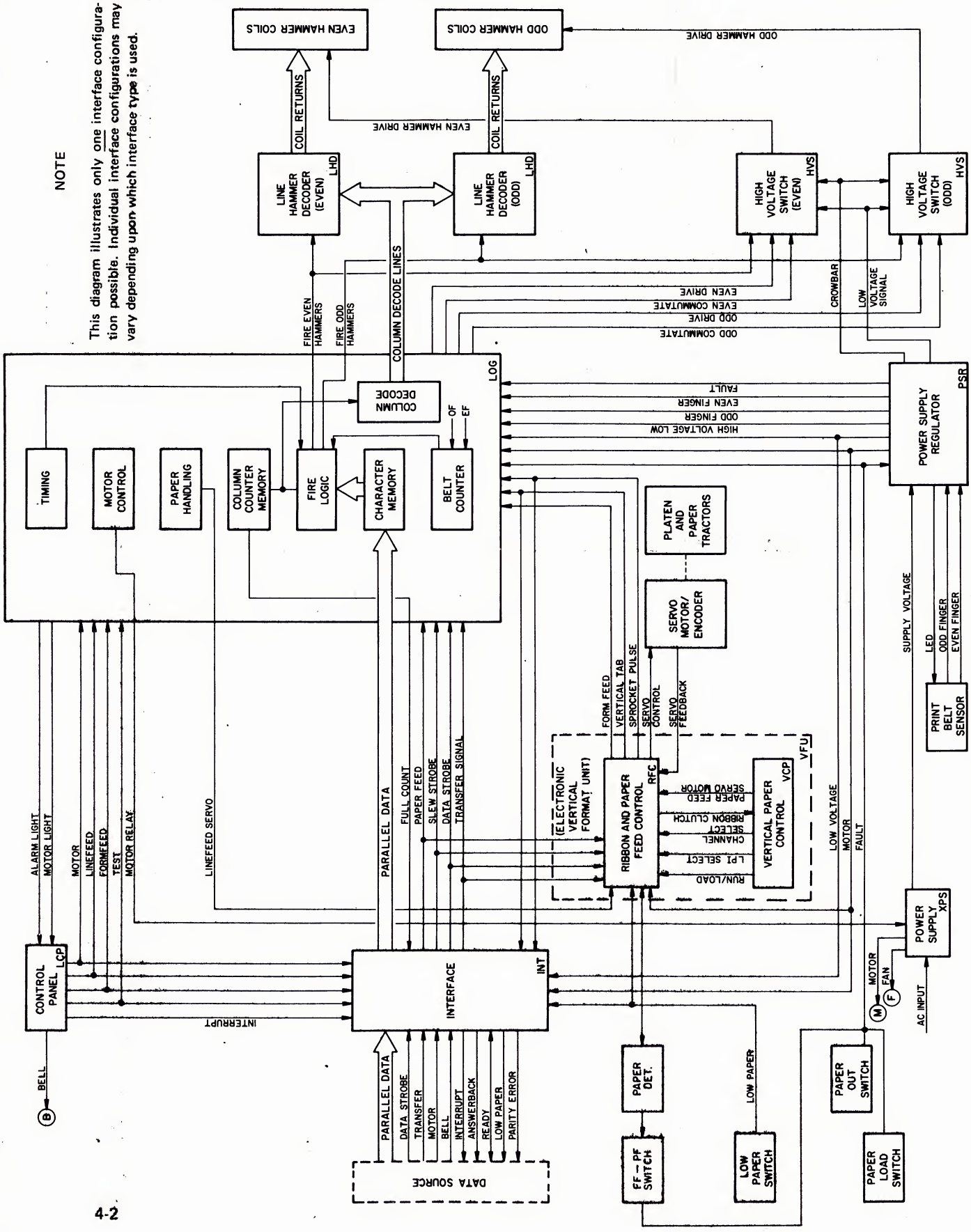

Figure 4-1. TermiNet 510 Corresponder Functional Block Diagram

MOTOR CONTROL

When power is first applied, all circuits of the Corresponder are initialized. At that time, the motor is off, the print memory is cleared, and the Corresponder is in the load condition. When the MOTOR ON signal is received from the pushbutton on the control panel, or remotely from the data source, the motor timer signal MTD energizes the motor relay on the XPS board. MTD will remain on long enough to allow the print belt to attain full speed. The MOTOR ON signal also clears any prior alarm condition. Whenever an alarm condition exists in the Corresponder due to a fault, paper out, or low speed detection, the appropriate circuits on the LOG board will turn the motor off.

DATA TRANSFER*

When the Corresponder is in the load condition, data is transferred bit parallel, character serial from the data source, through the interface, and into print memory on the LOG board. Character Data is received asynchronously at the Data Latches that are set by the Data Strobe. A synchronized Data Strobe then transfers each character from the latches to the print memory, shifting the print memory and advancing the column counter. When the full line of characters has been transmitted, a transfer signal from the interface clears the load mode and the print sequence begins. A print complete signal sets the Load circuit to return the Corresponder to the load condition when the data has been printed.

PRINTING

Printing is accomplished by energizing the desired print hammer solenoids at the appropriate belt position so that they strike the desired moving type finger. Basic timing for the print dynamics is provided by drive counters on the LOG board. The counters are initialized to the drive state by each finger timing signal from the PSR board and then advanced through succeeding states by the system clock. A Drive Signal turns on a High Voltage Switch (HVS board) which applies power to its respective Hammer Bank to energize those columns which have been pulled by Column SCR's on the LHD board. At the end of the drive period, a commutate signal from the LOG board causes the High Voltage Switch (HVS board) to supply a negative voltage to its hammer bank for commutation of the column SCR's on LHD. Finally, the drive counter on LOG advances to the compare state removing the commutate signal to allow the HVS to again go positive so that column SCR's may be fired in preparation for the next drive period. Since belt timing alternates between even and odd finger signals, all drive timing is symmetrically interlaced.

When the print condition exists, Print Memory is shifted and circulated at system clock rate and the Column Counter is advanced to keep in step. Belt position is derived from the belt timing signals and it is compared with the character code and the associated column number to produce the column SCR firing pulses. Each time a fire pulse is emitted, an erase signal is applied to the data multiplexer to remove the character from memory by preventing recirculation. The LOG board also contains circuits that prevent firing hammers when the motor is stopped, when paper is in motion, when the maximum fire counter is limiting, or when there is no compare signal from either of the drive counters. During the inhibit fire condition, printing is suspended but no data is removed from memory. The belt printing logic contains circuits to detect an empty memory and generate a print complete signal.

PROTECTION

To protect the Corresponder against energizing too many hammer solenoids at one belt position, a Maximum Fire Counter receives all SCR fire pulses. If it counts an excessive number of pulses, it produces a fire limit signal to suspend firing for the remainder of that finger period. This counter is restored by the belt timing signals at the beginning of each finger period. Suspension of firing causes no data loss but it delays the printing of the suspended characters for one full font period.

To prevent printing characters at an average rate that cannot be sustained by the Corresponder, a Rate Control Counter on the LOG board produces a Rate Limit signal to delay the Print Complete indication and suspend transfer of more data.

PAPER ACTION CONTROL

Platen and paper tractor motion in the Corresponder are controlled by the line feed servo and associated

*May vary with type of Interface used.

circuits. The associated circuits consist of the VCP board, the RFC board, and the LOG board. Switches on the VCP board allow the operator to select line spacings of 4, 6, or 8 lines per inch, the vertical form format channel to be used, and RUN/LOAD operation. The RFC board controls the ribbon magnetic drive clutch, and also interfaces the line feed servo motor to the LOG board. The line feed servo is used in the execution of any of the four paper actions; line feed, form feed, vertical tab, and vertical slew. All paper actions may be initiated by a remote data source. Also, line feed and form feed pushbuttons are provided on the front panel for manual control. The vertical form format channel select switch on the VCP board provides selection for any one of the eight paper control programs stored in the RFC board memory. These programs provide form feed, vertical tab, and sprocket pulse control signals to the LOG board.

When the optional Sheet Feeder is employed, the vertical format control cannot be used. In this case, the paper commands FF and VT are used in the data stream to select paper from bin one or bin two respectively of the sheet feeder. Locally, paper can be controlled by using the front panel switches FORM FEED, MOTOR ON, and TEST (see Figure 3-2 for a complete description of these controls).

SELF TEST FEATURE

The LOG board also provides circuits for the self test feature on the Corresponder. From the TEST pushbutton on the front panel, a test signal is applied to the Test Generator which produces characters in ascending order of the ASCII code during a test load sequence. When a line of data has been generated, a stop test generation signal from the Column Counter halts the generator counter at the proper position and stops the load sequence. When printing of the line is complete, the print complete signal triggers the line feed timer. Also the test generator resumes its generation of data starting one character code lower than it did for the previous line. Thus, a staggered test pattern is printed.

The test function is inhibited when the optional Sheet Feeder is employed. In this case, operating the TEST pushbutton on the front control panel will cause the Corresponder to eject paper clearing the paper path.

SECTION 2

MECHANICAL OPERATION

MAIN DRIVE

Drive power (Figure 4-2) for the Corresponder is provided by the main drive motor, located at the left rear side of the Corresponder. Power from the motor is transmitted by means of a drive belt, connected to the idler pulley on the main frame. A second belt on the idler pulley then drives the print belt. The print belt is geared to the ribbon drive clutch mechanism. Both the print belt and the ribbon drive clutch are driven anytime the motor is running.

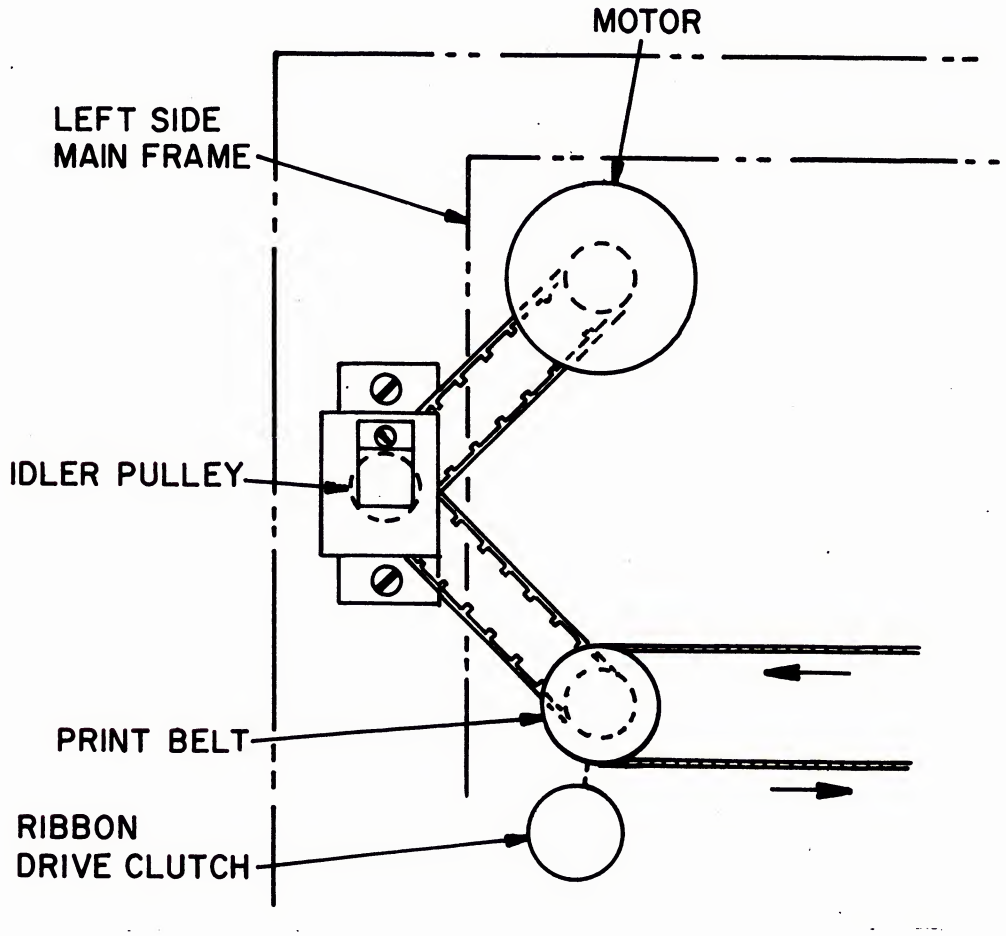

Figure 4-2. Drive Mechanics

RIBBON DRIVE

The TermiNet 510 Corresponder uses two separate drive shafts (Figure 4-3) to advance the film and fabric ribbons. A magnetic drive clutch, mounted on the fabric ribbon drive shaft, is directly geared to the left print belt pulley. The fabric ribbon drive shaft is directly geared to the film ribbon drive shaft. As the left print belt pulley and the drive gear on the magnetic clutch rotate, the RFC board energizes and de-energizes the magnetic clutch to turn the ribbon drive shafts. The RFC board controls ribbon movement to occur only when the Corresponder is printing. When the fabric ribbon is used, the spindle on the end of the fabric ribbon drive shaft engages a specially designed hub in the fabric ribbon cartridge. This hub is designed to break in the event that the fabric ribbon jams or hangs up for any reason. When the film ribbon is used, the film ribbon drive shaft engages a hub on the special ribbon holding plate. In the event of a jam when using the film ribbon, the film ribbon will break to protect the drive spindle. Both ribbon cartridges contain a manual ribbon drive knob, that can be rotated to drive the ribbons inside their cartridges. This feature allows easier cartridge installation by permitting operators to remove any ribbon slack.

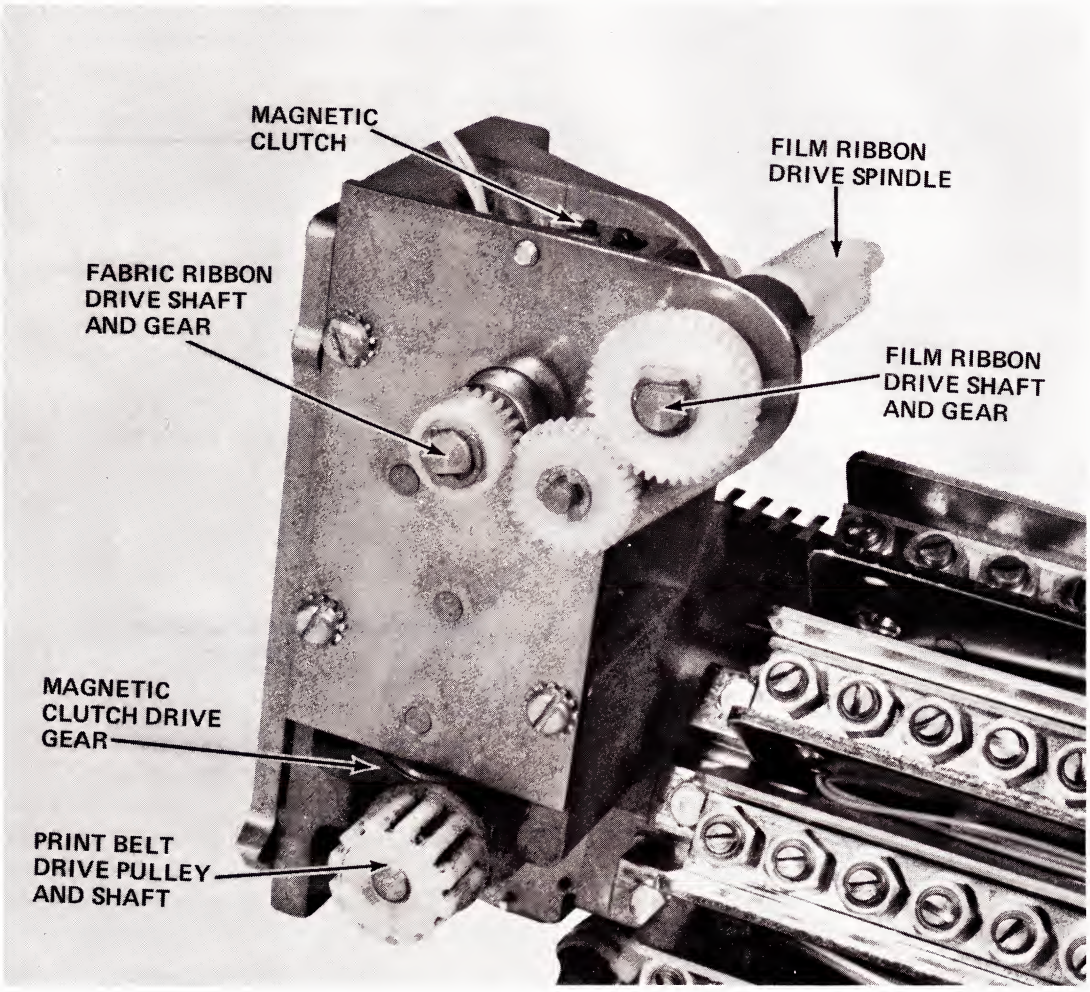

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Figure 4-3. TermiNet 510 Corresponder Ribbon Drive

HAMMER AND PRINT BELT ASSEMBLY

The TermiNet 510 Corresponder (see Figure 4-4) uses a flexible belt to carry the type fingers used for printing. The fingers are mounted in vertical slots in the belt. Each finger has a type character or symbol embossed on the upper end. A two font belt holds two sets of 96 characters. A three font belt holds three sets of 64 characters while the four font belt holds four sets of 48 characters. The fingers can be replaced by lifting them vertically out of the finger slot in the belt. Note that some of the fingers (font fingers) are special index fingers. These fingers are wider at the bottom and serve as a reference point to trigger an electronic counting circuit used in the hammer and print finger actuation. These fingers must be removed by pulling them out of the bottom of the belt rather than from the top of the belt.

The print belt is driven by an AC motor and belt-drive system. The print belt travels counter-clockwise (as viewed from the top) at a constant rate in front of the paper and platen. Both ribbons pass between the type fingers and the paper. Printing takes place when a type finger is driven by a hammer against the ribbon and paper.

The position of each character in the belt is relative to the special wide index finger that is detected by the photoelectric light beam. This wide index finger triggers an electronic counting circuit that counts the finger movement of the belt. As the fingers in the belt move past each possible print column position, the column position is compared with the stored input data to determine when the finger is in the correct position. When this comparison indicates that the selected character is in the correct column position, the appropriate hammer is fired. There is a hammer in each print position (column), for a total of 132.

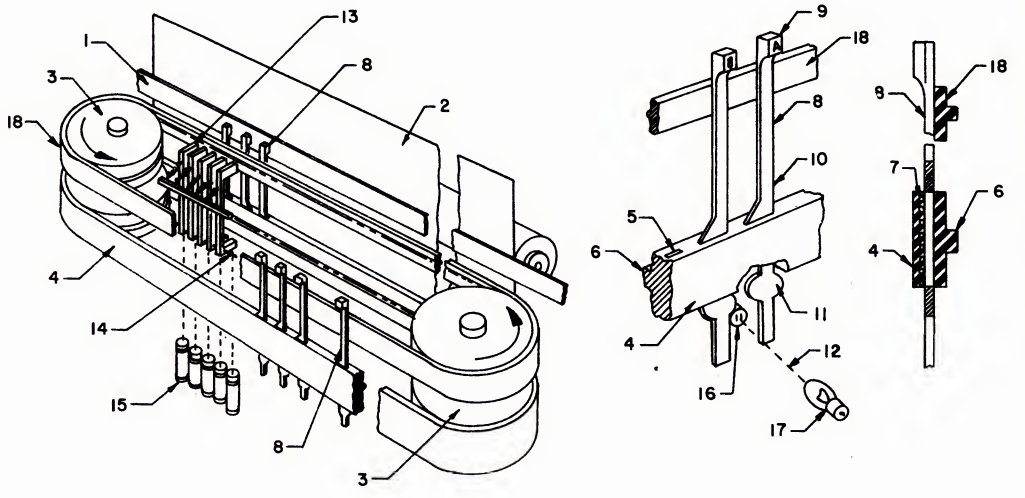
All of the individual hammers (see Figure 4-5) are mounted on a common pivot rod. Each hammer is connected by its clevis to a solenoid plunger. The clevis engages a curved slot at the base of the hammer. The other end of the clevis is linked to the solenoid plunger. When the solenoid coil is energized by the hammer drive circuit, the clevis is pulled down by the plunger, causing the hammer to pivot forward about the pivot rod. The face of the hammer travels forward approximately .077 inch (2.0 mm) while being pulled by the clevis. The curved slot at the base of the hammer serves a dual purpose. It provides an easy means for disconnecting the clevis and allows a means of overtravel (free-flight) for the hammer.

The actuation of a hammer against a print finger is electronically controlled by a timing process which uses an electronic buffer storage and counting system. When a character printout is selected by input data, the Corresponder buffers or stores the input data and permits multiple hammer firing when selected fingers are in the correct position.

The solenoids are mounted and spaced uniformly in banks on the coil bar assemblies. There are four coil bar assemblies mounted parallel to each other with an angular displacement. Each coil bar assembly consists of a top and bottom piece and two side pieces. The bars are supported at the ends by the belt pulley castings.

The solenoid plunger enters a hole in the top member of the coil bar. The bottom portion of the coil bar has a threaded hole to receive a threaded solenoid pole piece. The penetration of the pole piece in the coil bar is adjustable, and its position or depth is secured by a locking nut. This allows a travel adjustment of the upper plunger. The timing process of actuating a hammer is effected by the photocell position. The time from coil energization to hammer strike is approximately 1.3 milliseconds. When the hammer is at rest, it is held against the hammer backstop bracket by the hammer spring.

The narrow belt that rotates directly on top of the print belt pulleys, serves as a traveling rebound belt for the print fingers (see Figure 4-4). The traveling rebound belt along with the rebound bar acts as a stop for a finger after a character has been printed. This prevents the fingers from oscillating and snagging on the hammers.



1 INKING RIBBON
2 PAPER
3 PULLEY
4 BELT (TYPE FINGER CARRIER)
5 FINGER SLOT
6 BELT TRACK
7 STEEL CABLE
8 FLEXIBLE TYPE FINGER
9 TYPE FACE
10 FINGER UPPER SHOULDER
11 FINGER LOWER SHOULDER
12 LIGHT BEAM
13 HAMMER
14 HAMMER PIVOT SHAFT
15 HAMMER SOLENOID
16 PHOTOELECTRIC PICKUP
17 LIGHT SOURCE
18 REBOUND BELT

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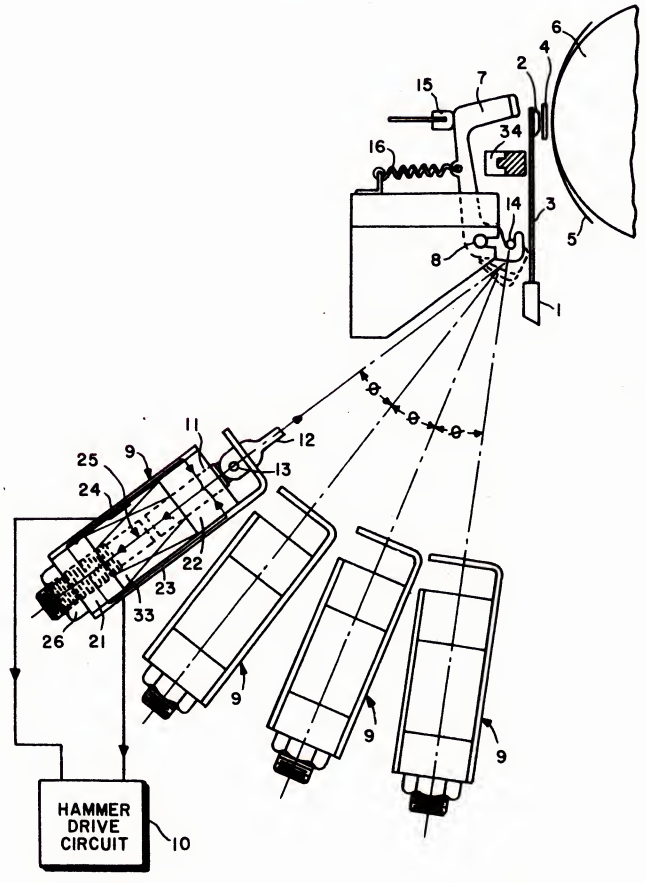
Figure 4-4. Hammer and Print Belt Assembly Parts Outline



1 PRINT BELT
2 TYPE FACE
3 PRINT FINGER
4 INKING RIBBON
5 PAPER
6 PLATEN
7 HAMMER
8 PIVOT ROD
9 COIL BAR
10 HAMMER DRIVE CIRCUIT
11 SOLENOID PLUNGER
12 CLEVIS
13 CLEVIS PIN
14 CLEVIS PIN
15 HAMMER BACKSTOP BRACKET
16 HAMMER SPRING
21 COIL BAR, BOTTOM
22 COIL BAR, TOP
23 COIL BAR, SIDE
24 COIL BAR, SIDE
25 POLE PIECE
26 NUT
33 COIL WINDING
34 REBOUND BAR AND REBOUND BELT

PTM-6157

Figure 4-5. Hammer Actuation Mechanics

PAPER HANDLING

GENERAL

Fan-fold type paper, punched along the edges for pin feeding is supplied to the TermiNet 510 Corresponder through either a front or rear paper entrance.

CAUTION

Multiple part forms must always be supplied from the front paper entrance.

The paper is moved through the Corresponder by means of a Paper Handler that consists of a right and left paper tractor, a tie rod, and a drive shaft.

A paper out switch located at the rear of the hammerbank and beneath the left end of the platen senses a paper out condition and causes an "alarm" condition to exist. This causes the motor to stop and the ALARM light to light. The Corresponder motor cannot be turned back on until the paper out condition is cleared.

In addition to the paper out switch, a sensor is available which can be enabled to sense a low paper condition. The standard low paper sensor is mounted on the rear paper entrance pan. An optional front low paper sensor can be located outside the pedestal cover just under the front of the Corresponder. When a low paper condition is sensed, a signal is sent to the Interface board. Depending upon which particular interface board is being used, one of several actions may be taken: an alarm condition may be triggered; an indicator may be turned on, or the data source may be alerted and no Corresponder action taken.

PAPER TENSION

Tension is applied to the paper through the use of a paper tensioner. The paper tension is controlled by a lever that can be placed in one of two positions. Placing the lever in the LOAD (L) position allows paper to be installed, and disables the Corresponder motor circuit. Placing the lever in the RUN (R) position applies tension to the paper and enables the Corresponder motor circuit.

LINE FEED

Paper advancement is accomplished by manually rotating the platen knob or by electrical/mechanical feed.

The line feed servo is used for normal line feed. When a line feed is selected, the line feed servo is energized causing the drive belt to advance the paper. The 4, 6, or 8 LPI control on the VCP printed wire board, will advance the paper depending on which setting is selected.

VERTICAL FORMATTING

The TermiNet 510 Corresponder uses an electronic vertical format unit (VFU) to allow vertical formats to be selected when printing. The VFU select circuitry is located on the right rear side of the main frame. This circuitry allows any one of eight different preprogrammed formats to be switch selectable. The preprogrammed formats are stored in a memory on the RFC printed wire board in the bustle assembly, and may be changed or reprogrammed at any time by the machine operator.

SHEET FEEDING

Single sheets can be printed when the optional Sheet Feeder is used. In this mode of operation, vertical formatting cannot be used. FF and VT codes are used to control paper selection from the Sheet Feeder. This is accomplished via mechanical interface between the Corresponder and Sheet Feeder. Receiving an FF code will cause the RFC circuit board to issue commands to the servo motor that result in platen movements as shown in Tabel 4-1. Likewise, the VT command will cause another set of platen movements. Paper is then selected by the Sheet Feeder from either bin 1 or bin 2 according to the particular combination of platen movements sensed.

TABLE 4-1

PLATEN MOVEMENTS CAUSING SHEET FEEDER ACTION

DIRECTION	BIN 1	BIN 2
Reverse	6	9
Forward	4	4
Reverse	36	48
Forward	28	28

SECTION 3

PRINTED WIRE BOARDS

HIGH VOLTAGE SWITCHER BOARD (HVS) 44C417519

FUNCTION

Two HVS boards (Figure 4-6) are used in the TermiNet 510 Corresponder. Each board is identical to the other one. The HVS boards installed in the even HVS and odd HVS bustle positions control voltages used for firing all of the even and odd hammers respectively.

The HVS board provides protection against over current or over voltage to protect the hammer coils.

FUSES

None

STRAPS HVS/5

Hit Limit 8: J2 IN
J1 & J3 OUT

TEST POINTS AND WAVEFORMS

TP1 Crowbar

TP2 EHD (or OHD) Bus Output Voltage. Use TP4 (OV) to reference scope to ground. With test probe on TP2, adjust sweep to observe the trace shown in Figure 4-7.

TP3, TP5, and TP6 - For factory use.

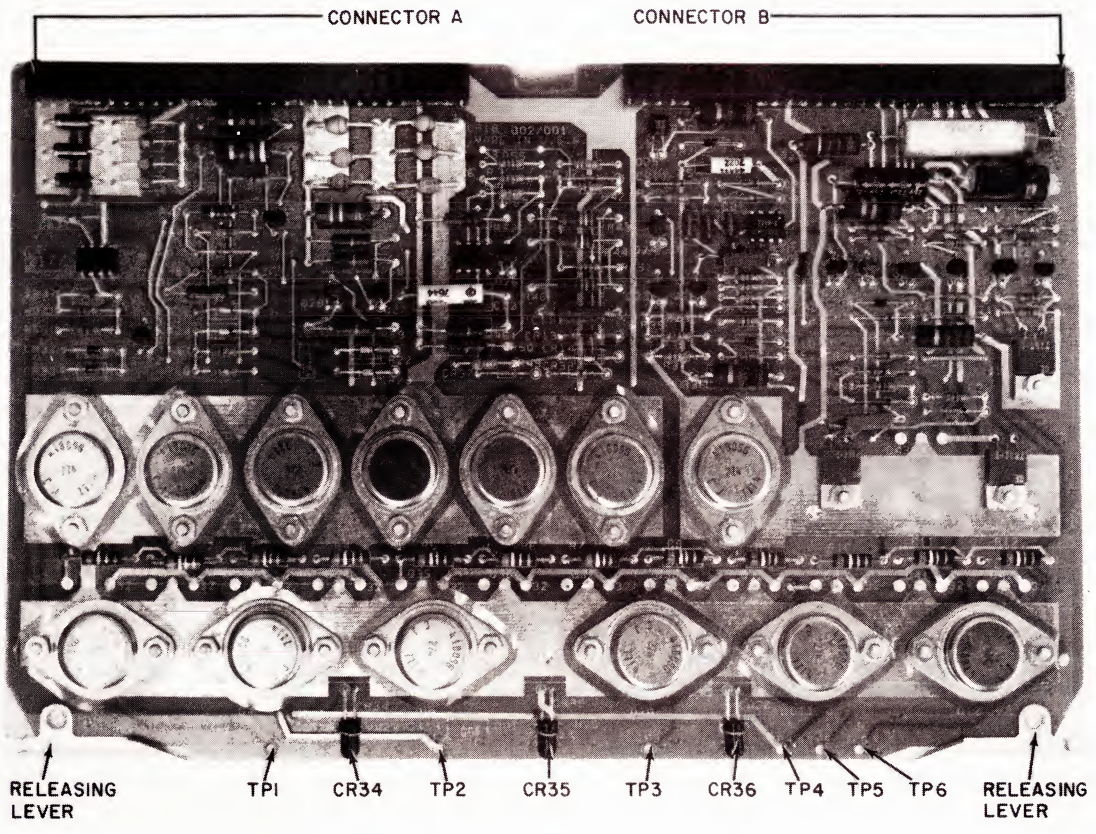


Figure 4-6. High Voltage Switcher Board (HVS)

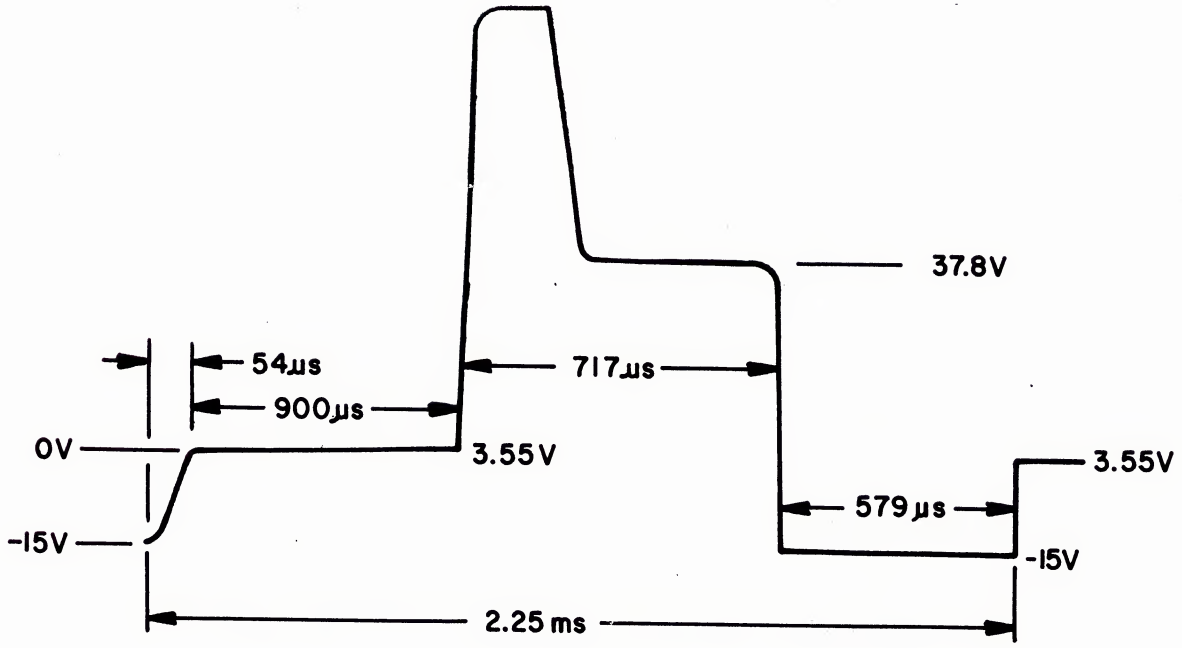


Figure 4-7. HVS Board Test Point TP2 Waveform

PLH-7033

PRINCIPLES OF OPERATION (Figure 4-8)

The HVS PWB receives three signals from the LOG board (commutate, drive, and fire), one signal from PSR (LVS), and several DC voltages from PSR (+109, +15, -15, and -25). The HVS processes the above signals to produce a stepped waveform of voltage which is applied to a Hammer Drive Bus (EDB or ODB).

When the print belt is running, the output of one HVS should be as shown for TP2.

The two input signals (Drive and Commutate) from the LOG board perform the following function on the HVS board. If both Drive and Commutate are off, the input circuits tell the Op Amp to keep the output voltage at the Compare level, approximately 3.5 volts.

When the Drive signal is applied, the input circuits tell the Op Amp to cause the output voltage to be approximately 80 volts. Then, after a delay of 225 µs, the output voltage should drop to 38 volts and stay there until the Commutate signal is applied.

When the Commutage signal is applied, the HVS output voltage goes to approximately -15 volts. It should be noted that the Commutate signal has priority; that is, the Commutate signal forces the output to -15 volts regardless of what the Drive signal

is. The HVS output voltage is forced to -15 volts by the Pull-Down circuit.

The Op Amp itself cannot supply the voltage necessary for the output; therefore, the Op Amp is followed by a stage having a voltage gain of 11. Now, sufficient voltage is available but the power is too low.

The power is stepped up in a 4-stage emitter follower. This constitutes the power amplifier.

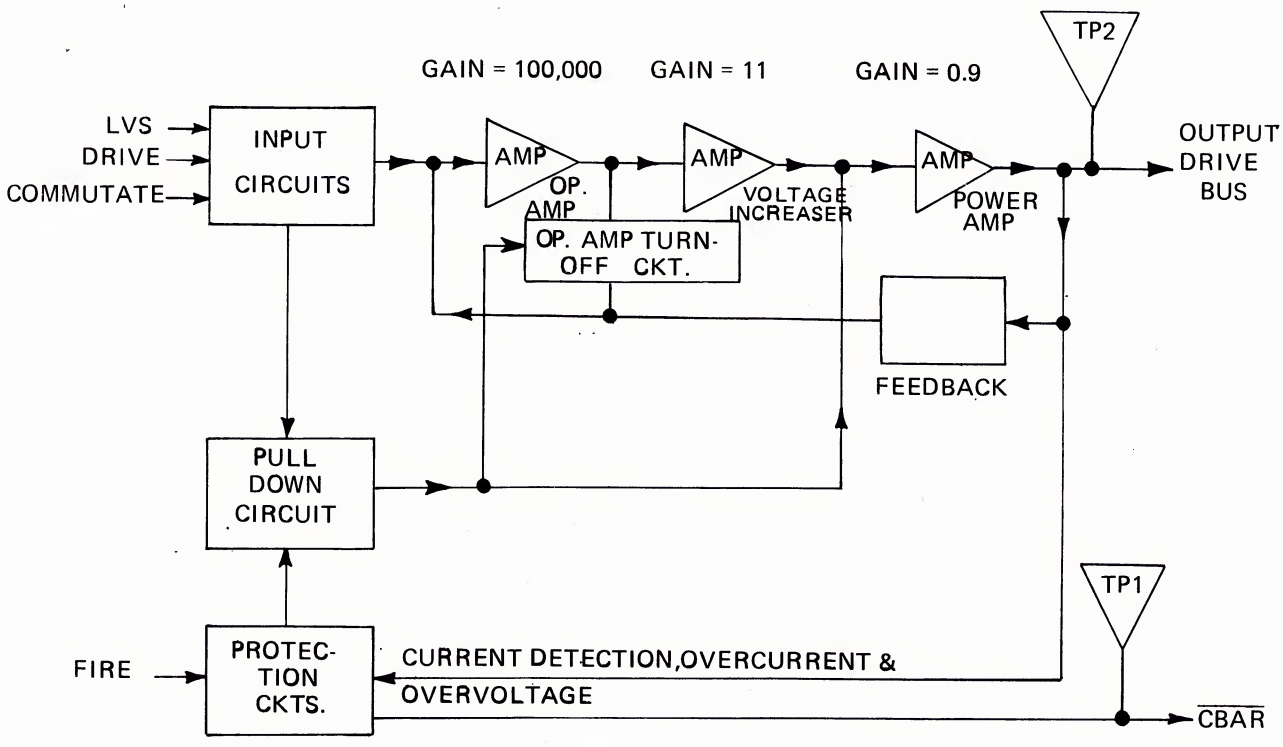
The protection circuits use a FIRE signal from LOG board and a Current Detect signal from the Power Amp circuit to detect repetitive hammer fire (LHD SCR shorted). The protection circuits also detect instantaneous overcurrent and bus overvoltage.

VISUAL INDICATORS

With normal operation CR34 (left side LED) should not glow; CR34 will glow whenever a CBAR output exists.

During normal operation, CR35 (center LED) will glow continuously when the print belt is running; otherwise it should not glow.

CR36 (right side LED) will flash intermittently as data is being printed. If no data is being entered, CR36 should not flash.



PLL-5050

Figure 4-8. High Voltage Switcher Board (HVS) Functional Block Diagram

LINE HAMMER DECODER BOARD (LHD) 44C417513

FUNCTION

The two LHD boards (Figure 4-9) used in the TermiNet 510 Corresponder are identical to each other. Each board controls hammer firing of all odd hammers or all even hammers depending on which bustle slot the board is inserted.

The LHD boards contain an SCR for each hammer position. The fire even (FEH) and fire odd (FOH) signals along with the decoded hammer drive signals that originate on the Logic (LOG) board are received on the LHD boards. These signals are used to control the turning on of selected SCR's energizing the associated hammer coils.

Voltages required for switching the SCR's and conducting the solenoid coils are supplied to the LHD boards by the High Voltage Switch (HVS) boards.

FUSES - None

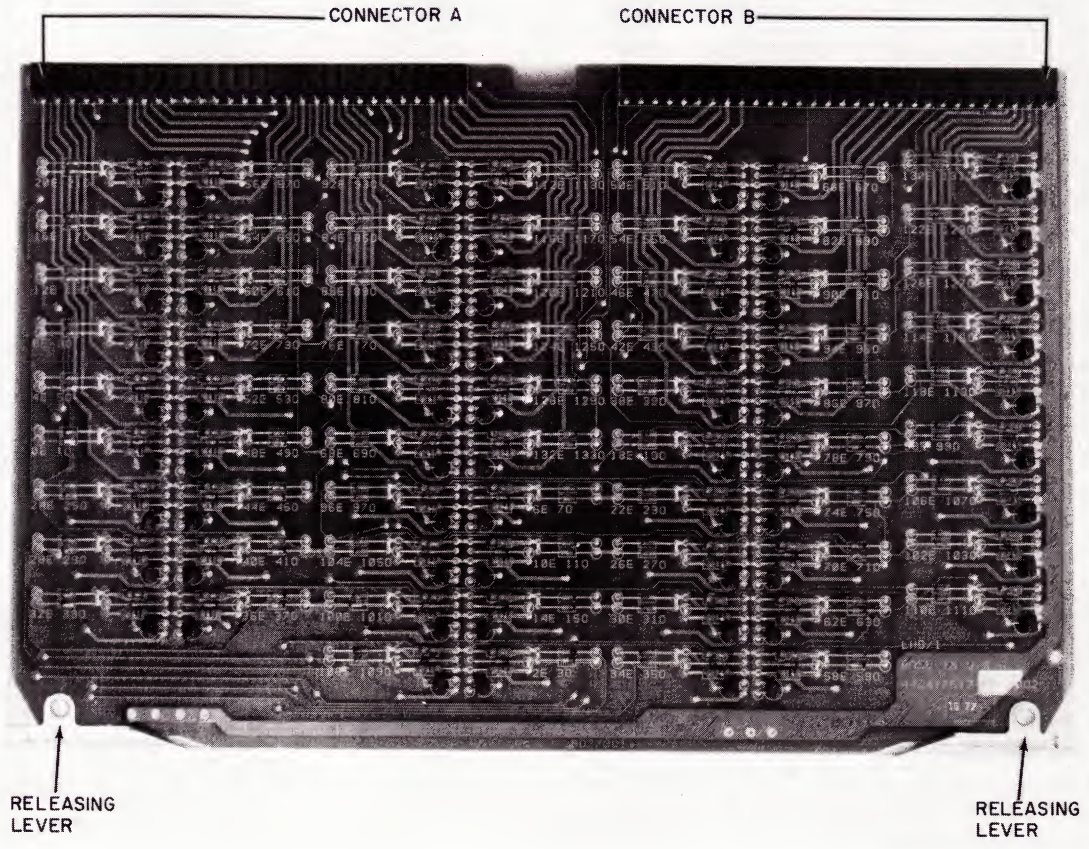
STRAPS - None

TEST POINTS AND WAVEFORMS - None

PRINCIPLES OF OPERATION (FIGURES 4-10 TO 4-13)

GENERAL

The Line Hammer Decoder PWB's accept the decoded hammer drive signals from the Column Counter & Decoder (CCDE) logic located on the Logic (LOG) PWB for subsequent decoding that enables the individual hammer solenoid circuits. The LOG PWB also provides two differentiating signals that identify whether the hammer solenoid circuit to be enabled is an even or an odd print position. Within a cycle time of approximately 2.2 milliseconds, up to eight hammer solenoid circuits can be enabled, fired, and turned off. Since the one group of even hammer



PLH-7034

Figure 4-9. Line Hammer Decoder Board (LHD)

solenoid circuits are being enabled during the firing and subsequent turn-off of a group of odd hammer solenoids, then the two LHD logic arrays, through an interlace pattern, can print up to 60 characters in 2.25 ms under optimum data transfer.

COMPARISON CYCLE

During a 900 µs period, up to 30 comparisons are made of the hammer drive signals from the LOG PWB. The hammer drive signals consist of two groups. The one group is in increments of 16 to enable a series of eight odd or eight even gate circuits, while the other group is in increments of two to enable one odd or one even gate circuit within the group of 16. The incremented-by-16 hammer drive signals are $\overline{H0}$, $\overline{H16}$, $\overline{H32}$, $\overline{H48}$, $\overline{H64}$, $\overline{H80}$, $\overline{H96}$ and $\overline{H112}$. The incremented-by-2 hammer drive signals are $\overline{HZ}$, $\overline{H2}$, $\overline{H4}$, $\overline{H6}$, $\overline{H8}$, $\overline{H10}$, $\overline{H12}$ and $\overline{H14}$.

To differentiate whether the comparison is for a group of even or a group of odd hammer solenoid circuits, the Belt Counter & Comparer (BCOM) circuits on the LOG PWB provides two signals, Fire Even Hammer (FEH) and Fire Odd Hammer (FOH), thus enabling the LHD gate circuits on the one LHD PWB. Then during the subsequent comparison cycle, enabling the LHD gate circuits on the alternate LHD PWB. Therefore, since either all even, or all odd enabling comparisons occur at any given time, up to 30 even comparisons can be made during the 900 microsecond comparison period. During these alternate interlace periods, up to 30 odd comparisons can be made. The LHD PWB in the odd bustle slot is enabled by the FOH signal, while the LHD PWB in the even bustle slot is enabled by the FEH signal. Thus all odd hammer solenoid decoding gates are located on the LHD/ODD PWB and all even hammer solenoid decoding gates are located on the LHD/EVEN PWB.

To decode at the gate to an SCR for enabling during the comparison cycle, three signals must be present simultaneously. These signals are one of the incremented-by-16 hammer drive signals, one of the incremented-by-2 hammer drive signals, and, if an even print position is to be enabled, the FEH signal. If an odd print position is to be enabled, then the FOH signal would be required. Therefore, although both an even and an odd print position have the same hammer drive signals present simultaneously, the FEH and FOH signal differentiates whether the even or odd gate will be enabled to switch on the SCR controlling the conduction path through a hammer solenoid.

During the comparison cycle, the odd, or even group of decoder circuits will have a positive voltage of approximately 3.5 volts present on the anode of the SCR. The cathode of the SCR is connected to 0 volts potential. Thus, if the gate circuit connected to the SCR gate is enabled by the correct hammer drive signals and the correct differentiating control signal, FOH or FEH, then a positive potential is felt at the SCR gate, switching the SCR into the conduction state. This low voltage (3.5 volts) does not provide sufficient power through the hammer solenoid to cause the hammer to be thrown. Therefore, since all the even, or all the odd SCR's will have this small voltage level applied during the comparison cycle, as the hammer drive signals are generated and decoded, the SCR's of an even group, or the SCR's of an odd group, can be switched on, one at a time, during the comparison period. Hence, during optimum data transfer periods, up to eight SCR's can be switched on during a comparison period. When the accelerate voltage (approximately +109 volts) is applied to the selected group of SCR's, the eight hammer solenoids through which a conduction path exists will be simultaneously energized. This causes the corresponding hammers to be thrown forward.

ACCELERATE AND HOLD CYCLE

Following the comparison cycle, the accelerate and hold cycle occurs. The accelerate period is for a period of 225 µs and is followed by the hold period of approximately 495 µs, for a total of approximately 720 µs. During this time the SCR's selected during the comparison cycle will have +109 volts applied at the anode, causing a high current conduction path to exist through the corresponding hammer solenoid. This will pull the selected hammers forward. Once the pull of the hammer is started, the initial high potential necessary to initiate the action is reduced to a potential of approximately +37.8 volts, sufficient to provide a continued pull on the hammer to generate the necessary motion to throw the hammer forward for printing.

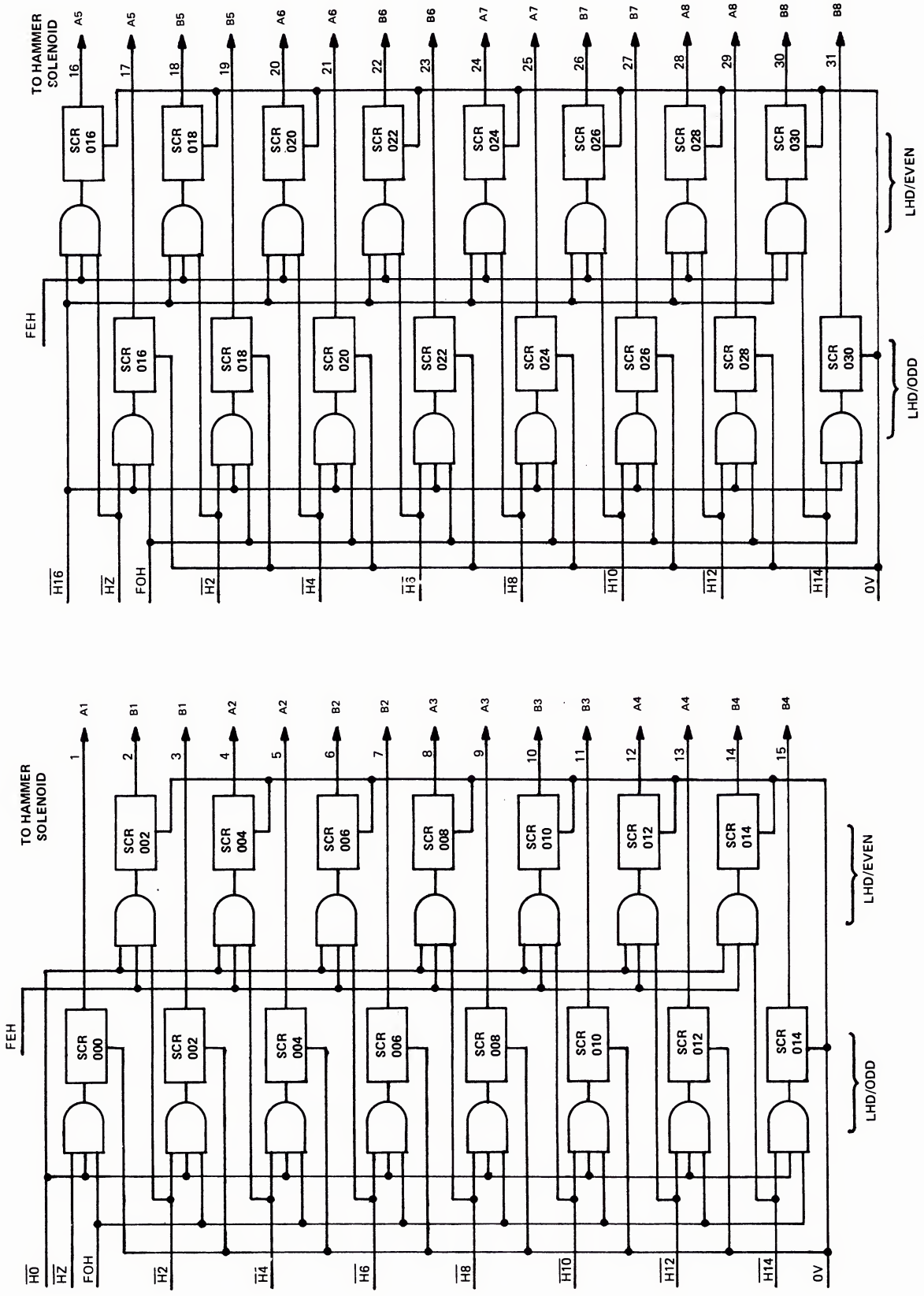
The timing of the application of this voltage potential is coordinated by the BCOM logic on the LOG board

so that the print fingers are in the proper location to provide the correct print character to appear at the proper time on the print belt during application of the accelerate voltage to a particular SCR. This will then enable multiple character printing along the line of print as a result of the correct decoding by the LHD gate logic.

COMMUTATE CYCLE

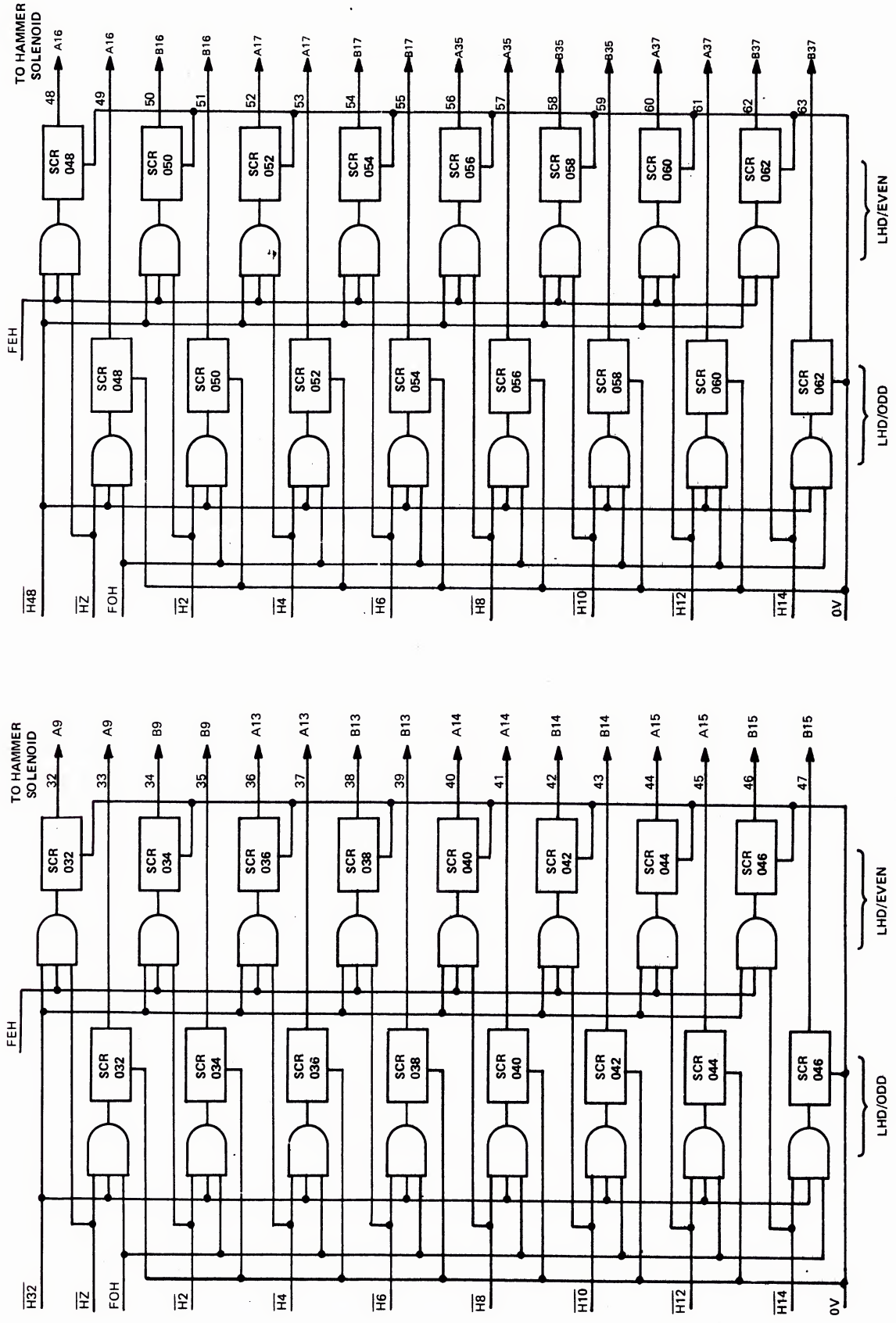
After the accelerate voltage drops to +37.8 volts, the hold period is terminated by the action of commutating the hammer solenoid voltage to -15 volts. This will reverse bias the SCR anode to cathode potential, stopping the conduction path through the SCR. The commutate cycle is approximately 580 µs in duration.

At termination of the commutate cycle, the hammer drive bus voltage level returns to the comparison cycle voltage level of approximately +3.5 volts. This enables passing the selected SCR circuits through another comparison cycle, and repeating the cycle of events described. Control of the voltage level switching is on the High Voltage Switch (HVS) PWB's.



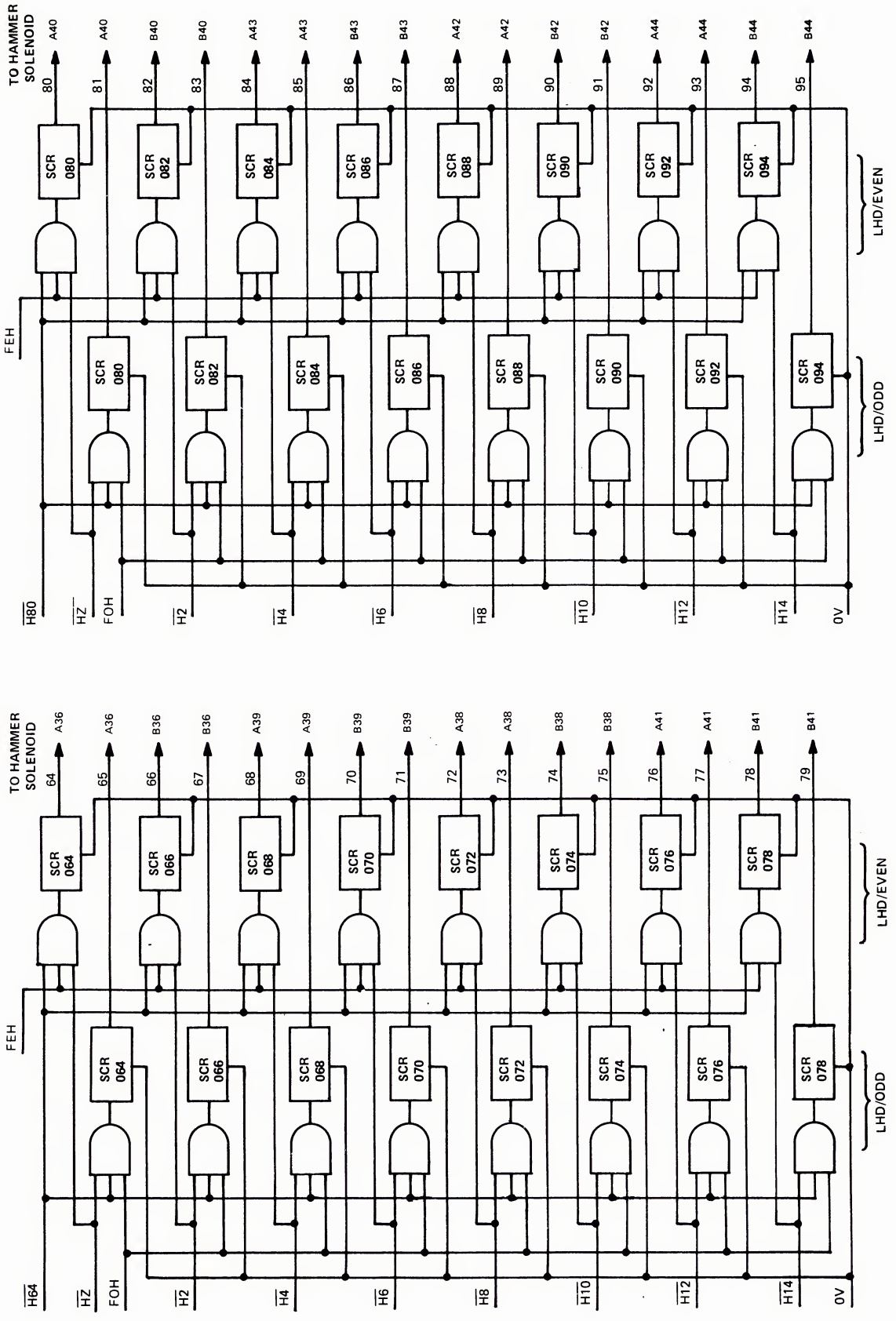
PLL-5052

Figure 4-10. LHD Board Circuits for Hammers 1-31



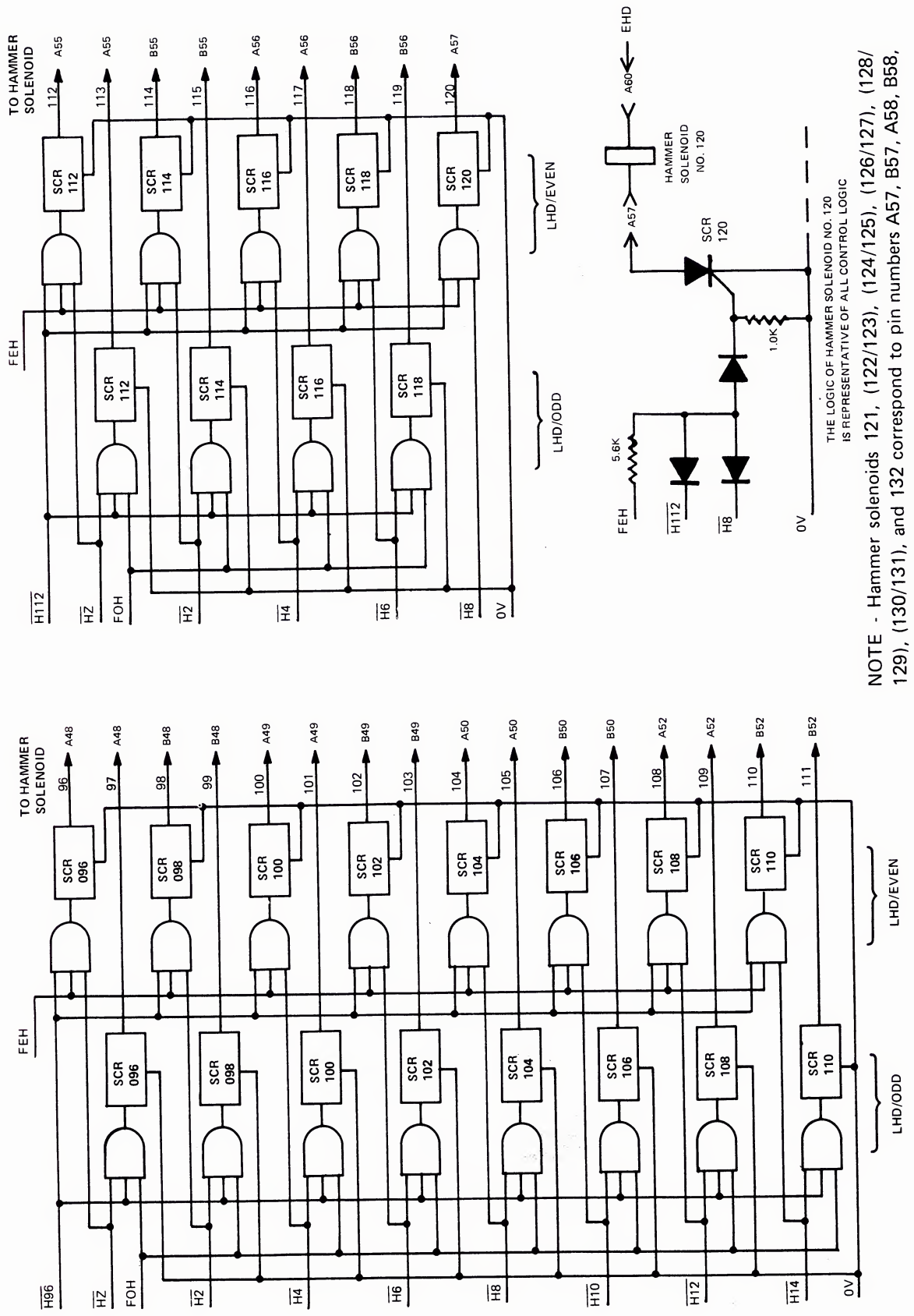
PLL-5053

Figure 4-11. LHD Board Circuits for Hammers 32-63



PLL-5054

Figure 4-12. LHD Board Circuits for Hammers 64-95



NOTE - Hammer solenoids 121, (122/123), (124/125), (126/127), (128/129), (130/131), and 132 correspond to pin numbers A57, B57, A58, B58, A59, B60 and A60 respectively.

PLL-5055

Figure 4-13. LHD Board Circuits for Hammers 96-120

POWER SUPPLY REGULATOR BOARD (PSR) 44C417520

FUNCTION

The PSR board (Figure 4-14) receives raw, unregulated DC voltages from the rectifiers on the XPS board. The functions performed by various circuits on this board are:

1. To regulate the four low voltage (+15, +5, -15, and -12 volt) power supplies.
2. Contains the crowbar circuit to turn off the high voltage supply in case of overcurrent detection.
3. To regulate the high voltage +157V unregulated DC power from the XPS board. The output of the high voltage regulator is 109V.
4. Comtains protection circuits that sense for high or low voltage conditions.
5. Contains the photoelectric sensing circuits that pick up and amplify signals from the print finger phototransistors.

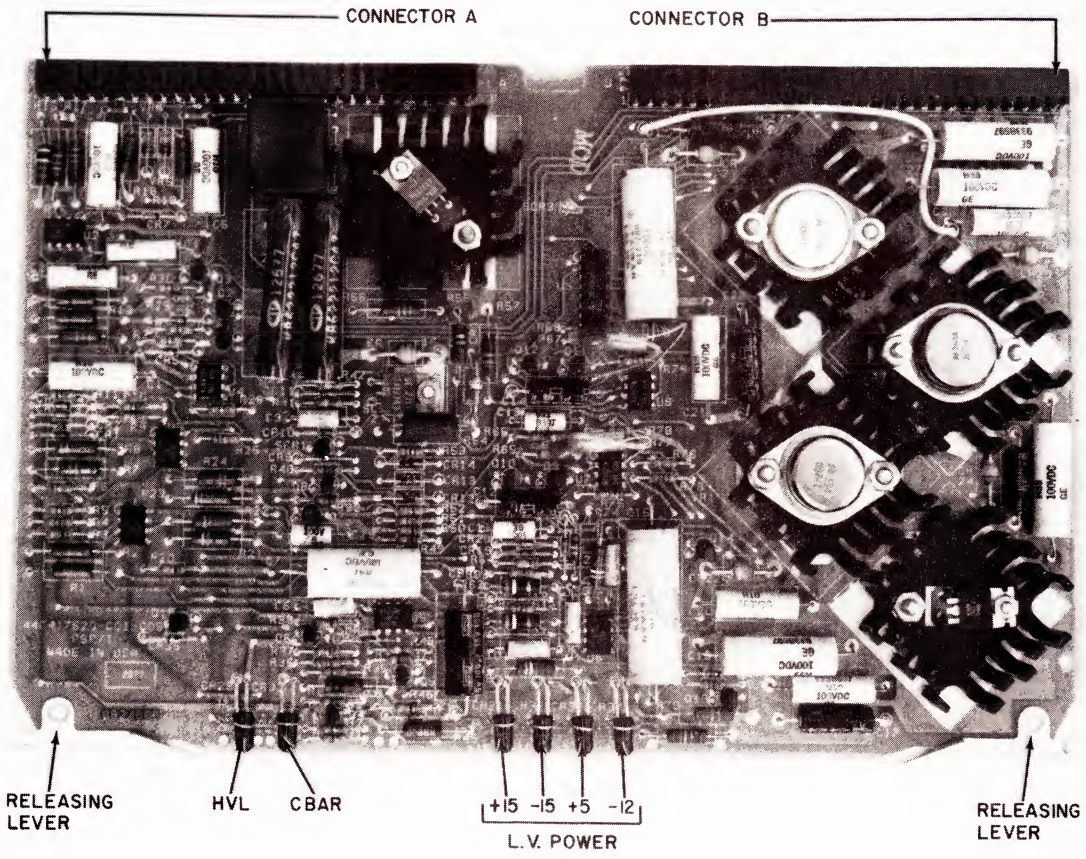
FUSES - None.

STRAPS - None.

TEST POINTS - Not applicable.

PRINCIPLES OF OPERATION (FIGURES 4-15, 4-16)

The four low voltage regulators receive low voltage, unregulated power from the rectifiers on the XPS board. These low voltage regulators contain built-in



PLH-7035

Figure 4-14. Power Supply Regulator Board (PSR)

protection against shorts, overvoltage, and heat build-up.

CAUTION

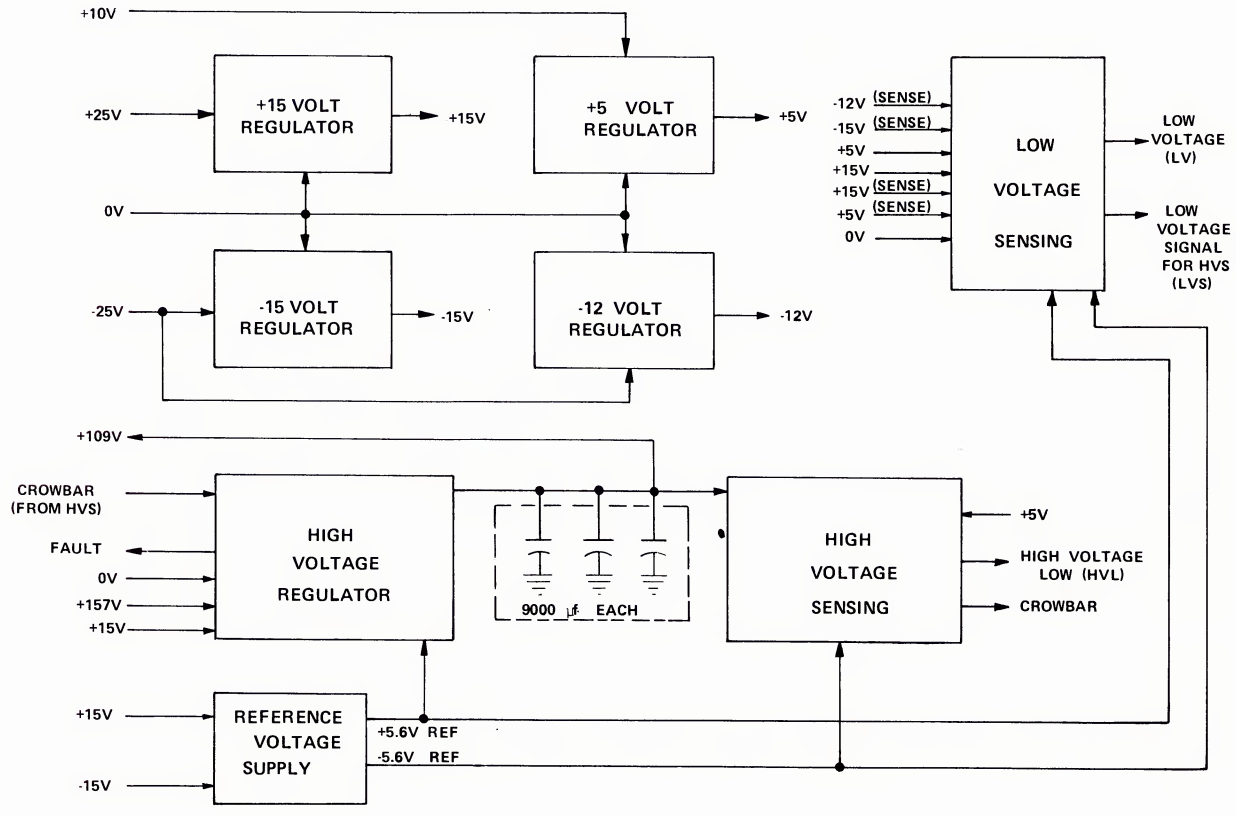
When operating a PSR board on an extender board while troubleshooting, heat will build up rapidly without benefit of the cooling fan. This may cause the regulators to turn off when they become overheated. After a cooling off period, they will return to normal operation.

The +157 volt unregulated supply from the XPS board is input to the high voltage regulator. This regulator contains a soft start feature to limit power in-rush. The high voltage regulator and associated protection circuitry will generate a crowbar signal when the 109V supply drops below 95V or reaches 120V. The high voltage sensing circuit compares the 109V supply with the -5.6V reference voltage.

Low voltage sensing circuits monitor the low voltage supplies for correct voltage levels. These protection circuits consist of four integrated circuits which are used for comparing the four low voltage power supplies with the two reference voltages. When a supply goes low, the output signal LVS is sent to the two HVS boards. This has the same effect as the commutate signal.

Status indicators located on the PSR board indicate the following abnormal conditions:

CR29 (HVL) – High Voltage Low Signal
CR30 (CBAR) – Crowbar Signal
CR31 (+15) – +15V Supply Low
CR32 (-15) – -15V Supply Low
CR33 (+5) – +5 Supply Low
CR34 (-12) – -12V Supply Low

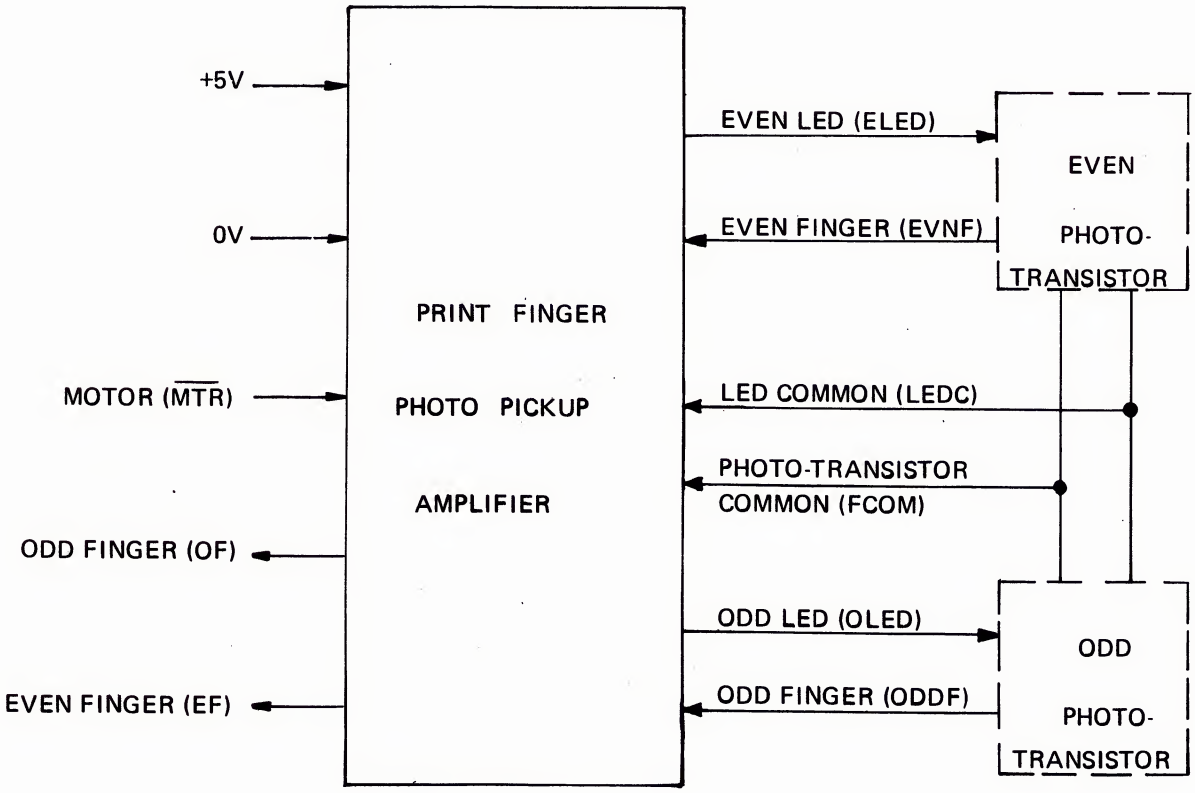


PLL-5057

Figure 4-15. Power Supply Regulator Board (PSR) Functional Block Diagram

PHOTOELECTRIC PRINT FINGER SENSOR (FIGURE 4-16)

The print finger sensor consists of two light emitting diodes and associated phototransistors. These devices are mounted in such a way that each moving print finger will interrupt a light path from a LED to the associated phototransistor. Circuits that shape and amplify the outputs of the phototransistors are located on the PSR board. To lengthen the life of the LEDs, the Motor signal ($\overline{MTR}$) is used for turning the LEDs off when the print belt stops running.



PLL-5058

Figure 4-16. Photo-electric Sensor Circuits on PSR Board

LOGIC BOARD (LOG)
44C417521

FUNCTION

The Logic (LOG) board (Figure 4-17) contains the circuits necessary to control the motor and line feed servo. This board also processes incoming data from the Interface (INT) board and sends it to the two Line Hammer Decoder (LHD) boards and print mechanism. Signals to and from the front control panel switches and indicators are also processed by this printed wire board.

STRAPS

J2 and J3 – Always Out
J4 to 80 – 80 column operation
J4 to 120 – 120 operation
J4 to 132 – 132 column operation

FUSES

F1 = 1/8 A PICO, Phase 1 clock
F2 = 1/8 A PICO. Phase 2 clock

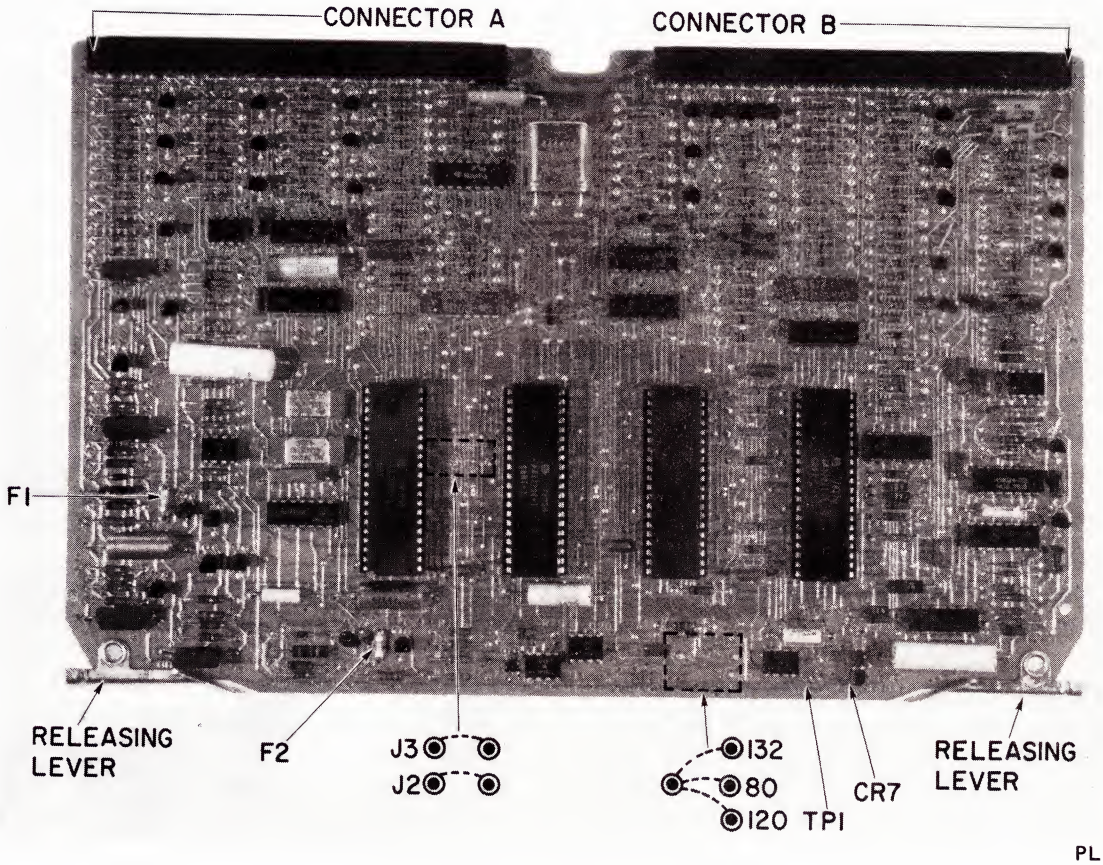
TEST POINTS AND WAVEFORMS

TP1 = VTFF voltage

PRINCIPLES OF OPERATION (FIGURE 4-20)

INTRODUCTION

The Logic Board (LOG) contains the circuitry associated with processing parallel data from the Interface (INT) board to the Corresponder print mechanism. This includes processing data to a one-line memory until a full line (up to 132 characters) has been stored. Upon completion of line storing, the Corresponder will begin the print cycle. This involves printing the characters in memory in the correct columns (print positions) at the correct time. As characters are stored in memory, a column counter advances in synch with the character memory. When characters



PLH-8044

Figure 4-17. Logic Board (LOG)

are read out of memory, the column counter will advance again in synch with the character memory. This allows the character being read out to have its associated column read out (from the column counter) at the same time. When the print belt is in the correct position, the column being read from the column counter will cause the activation of that particular hammer solenoid in the hammerbank assembly.

Paper handling logic is also contained on the LOG board. The recognition of a VT, FF, LF, Slew, VT and LF, or FF and LF will cause the LOG board to initiate paper slewing. This portion of the LOG board works in conjunction with the RFC board to reset the slewing sequence. This occurs after the proper number of linefeeds, as selected by the form feed format.

The Motor Control logic and the Alarm logic for the Corresponder is also found on the LOG board. The Alarm logic will be activated when the Corresponder is out of paper, when there is a slow speed on the print belt, or when there is a low voltage on any of the power supplies on the PSR board. A low speed detector has also been incorporated on the LOG board which will cause an alarm condition when the print belt slows down by approximately 12 percent of its rated speed.

A Test Generator Circuit will cause the Corresponder to print out a test pattern when the TEST push-button on the control panel is pressed. This circuit on the LOG board will feed its outputs directly to the character memory and processing will be the same as though data were received from the INT board. The test function will check all boards except the INT board.

The LOG board also contains two protection circuits; the Rate Limiter and the Hit Limiter. The Hit Limiter will not allow more than eight hammers to be driven to the platen simultaneously.

This protection will prevent drawing more instantaneous current than the +109V power supply can deliver. The Rate Limiter is used to prevent excessive print rates such that after several lines of print, the character-per-second print rate will stabilize at 510 CPS.

Finally, the LOG board contains the clocks and timing necessary for Corresponder synchronization. The timing is based on a 2-phase clock system, derived from a 3.2 MHz crystal clock oscillator.

DATA PROCESSING – THE LOAD CYCLE (FIGURE 4-20, Sheet 1)

Data will enter the LOG board in parallel on data lines DB1 through DB7. The data will be sensed at the INPUT DATA LATCHES. With each character sent to the LOG board, an accompanying data strobe pulse ($\overline{\text{DSTB}}$) will be sent to the STROBE CKT. The output signal (DATS) will cause the INPUT DATA LATCHES to strobe the character to the DATA MULTIPLEXER on lines DX1 through DX7.

Paper Control Character

If the character being sent to the INPUT DATA LATCHES is the paper control character, it will not be accompanied by a $\overline{\text{DSTB}}$ pulse. The data will be lost unless it satisfies the condition on INT as a slew command. In that case, a slew strobe will be sent to the INPUT DATA LATCHES. This will cause the character to be sent to the DATA MULTIPLEXER and also to the SLEW LOGIC AND COUNT network. The SSTB pulse will also be sent to the SLEW LOGIC AND COUNT such that the first six bits will enter a six bit down counter. The binary count loaded into the counter is the number of lines of paper to be fed vertically.

NOTE

The paper control character will be sent to the ONE LINE MEMORY but will not be entered due to signal TSR not being true. (TSR is dependent on DSTR.)

Upon entering a slew count, the signal SLG + 32 will come true to the $\overline{\text{LFG}}$ GEN circuit, and line slewing will occur immediately. The SPKT signal, generated on the RFC board, counts down the slew counter by one increment. When the counter reads zero, paper slewing will stop since SLG + 32 will go false. The T - 32 input to the SLEW LOGIC AND COUNT network will cause pulses on SLG + 32 each T - 32 time. While paper is slewing, data may be entered into

the DATA MULTIPLEXER and the ONE LINE MEMORY at the transfer rate. The SSTB signal will be present only during the paper control character time as established on the INT board while the Corresponder is in the LOAD cycle. A low voltage (LV) condition in the power supplies on PSR will cause the slew counter to reset.

Data Strobe Circuit

Each DSTB signal from the INT board will go to the STROBE CKT, producing a DATS and a DSTB output. The DSTB output will go to the STROBE MUX, which will output the signal TST + DS. This signal will pulse once for each DSTB received. The TST + DS signal will go to the LOAD ÷2 circuit. For every two data strobes, one LCTR signal will be sent to the TIMING CC LOGIC network. This will cause the signal TCC to increment the COLUMN COUNTER by 2. The counter will count in the sequence 2, 4, 6, 8, etc., through 66 and then reset to zero. The signal TST + DS will also cause the signal TSR to be sent to the ONE LINE MEMORY. A double pulse on TSR will clock two characters at once into the memory. It will also cause all characters in the memory to be shifted two places. This process will only occur during the LOAD cycle. Essentially, characters are loaded into the memory in pairs as the column counter counts by two. The ONE LINE MEMORY will hold 132 characters when the COLUMN COUNTER reaches 66; or 80 characters when the COLUMN COUNTER reaches 40.

Load Logic Network

The LOAD LOGIC network will set the data loading cycle. When $\overline{XFR}$ turns off, the LOAD LOGIC network will send the LOAD signal to enable the LOAD MUX, the INHIBIT FIRE circuit, and the LOAD FF. The LOAD MUX circuit will output a pulse every DSTB time to the END OF LINE circuit. The END OF LINE circuit will receive outputs from the COLUMN COUNTER. It will output pulses when the counter output is 40 (80 characters stored) and 66 (132 characters stored). Strap J4 will be positioned such that at one of the two counts, the FONT (FULL COUNT) signal will be sent to the INT board. This will cause a signal to be sent to the data source indicating a busy indication. The computer will send no more data until the print cycle is complete. Also, the INT board will turn on $\overline{XFR}$ which will be fed back to the LOAD LOGIC network to turn the LOAD signal off. This will initiate the beginning of the print cycle. When the printing of data is complete, the PC (Print Complete) signal will turn on at the input to the LOAD LOGIC network. When the $\overline{XFR}$ turns off, the signal LOAD will again turn on and another line of data will be transferred to the memory.

Timing CC Logic Network

The TIMING CC LOGIC network will control the upward incrementing of the COLUMN COUNTER. While in the load cycle, it will perform as follows:

TCC = INFIRE AND LCTR

The RESET CC LOGIC will perform according to this equation.

RCC = INFIRE AND (LFF AND CC = 66).

The COLUMN COUNTER will reset on the count of 66 indicating that the character memory is full. The reset pulse RCC will also cause the LOAD FF to reset.

Test Generator

When the TEST pushbutton on the control panel is pressed, the signal $\overline{TSTX}$ will set the TEST FF. This will cause the signal TST to be sent to the TEST GEN counter which will begin to count at the phase 2 clock rate from 32 through 127. The outputs from the counter will feed the DATA MULTIPLEXER and will be stored in character memory as with other data. The $\overline{TSTL}$ output from the TEST GEN will allow the data to pass from the DATA MULTIPLEXER to the ONE LINE MEMORY. The LOAD input must also be true. The TST output from the TEST FF will also cause the STROBE MUX network to turn on the TST + DS signal for the length of the self test. The TST + DS signal when received at the LOAD ÷ 2 circuit will cause LCTR pulses to be generated for every other count of the TEST GEN. The TSR signal will be generated by TST + DS for the length of the self test. Therefore, data characters will be entered into memory at the phase 2 transfer rate.

The TEST GEN counter will continue to count as long as TST is on. The counter will count from 32 through 127 and then reset to 32 repetitively. The ASCII printable graphics will be stored in the ONE LINE MEMORY until 191 characters have been sent. Assuming the memory to be clear, the first 132 characters will enter the memory. The COLUMN COUNTER will send one 159 pulse to the LOAD LOGIC when 59 characters have been entered into memory. When the memory is full, the COLUMN COUNTER will reset and data will be written into character memory over data previously stored until the COLUMN COUNTER outputs the next 159 pulse. The second 159 pulse will cause the LOAD LOGIC to turn off its LOAD output to begin the print cycle. Therefore, the TEST GEN circuit will have generated 132 + 59 = 191 characters, one less than the number of fingers on the print belt. When the characters in memory have printed, the PC signal will reset the TEST FF. The PC signal will also initiate one linefeed at the LF TIMER AND LOGIC circuit. The next self test line will start one character later such that multiple lines from the self test will print a staggered character pattern.

The TST and 159 inputs to the LOAD LOGIC network will override the $\overline{XFR}$ signal from the interface. When TST turns on, LOAD immediately comes true. When the second 159 pulse arrives, LOAD will go false. The PC signal will cause LOAD to go true again.

NOTE

The self test circuit will check all circuitry in the Corresponder except the SLEW LOGIC AND COUNT, the FORM FF, the TAB FF, and the INT printed wire board.

PAPER HANDLING LOGIC
(FIGURE 4-20, SHEET 1)

When the $\overline{LFX}$ signal is sensed by the LF TIMER AND LOGIC network and TST is false, the output LFP will be sent to the LFG GEN circuit. This will cause the signal $\overline{LFG}$ to be sent to the LFSO TIMER. The output pulse, $\overline{LFS}$, is amplified and sent to the XPS board as LFSO.

Feed Circuit

The $\overline{LFG}$ signal will also be sent to the FEED CKT which will output the FEED signal to the INT board. The signal FDG will also be sent to the HIT LIMIT 8 COUNTER to prevent printing during paper feeding. Finally, the $\overline{LFS}$ signal turning off will be sent to the CLP GEN circuit. This will reset the FORM FF and the TAB FF after linefeeding. This function will prevent premature triggering of a vertical tab or form feed.

Form Feed and Vertical Tabulation Circuits

When the $\overline{FFX}$ signal arrives at the FORM FF, the circuit will output the signal FFF. This will cause the $\overline{LFG}$ signal to be sent to the LFSO TIMER and linefeeding will occur. When the SPKT signal from the RPC board arrives, the FORM FF will reset to stop linefeeding. The TAB FF will work identically. A low voltage (LV) will reset both the FORM FF and the TAB FF circuits. Again, the signals FEED and FDG will be sent to perform the same functions as described previously.

DATA PROCESSING – THE PRINT CYCLE
(FIGURE 4-20, SHEET 1)

When the $\overline{XFR}$ signal turns on at the LOAD LOGIC network, the LOAD signal will turn off. When this happens, the Corresponder will immediately enter the print mode. The ONE LINE MEMORY and the COLUMN COUNTER will then be in synch from the load cycle. A steady double pulse on TSR to the ONE-LINE MEMORY will now be present throughout the print cycle. This will cause all characters in memory to be clocked out of the memory on output lines CH1 through CH7. These lines will feed the COMPARE LOGIC (Figure 4-20, sheet 2) and also back through the DATA MULTIPLEXER into the input of the ONE LINE MEMORY on lines DTM1 through DTM7. This will continue until all characters have been printed. One double pulse (TSR) will be sent to the ONE LINE MEMORY every 8.75 μs shifting two characters out of the memory. The cyle time for this operation is 577.5 μs. This is less time than it takes the print belt fingers to move one print position. Thus, every other character in memory can be read by the COMPARE LOGIC before the print fingers move one print position.

Compare Logic

The print belt moving counterclockwise will have all print fingers moving to either the odd print positions or the even print positions but not both simultane-

ously. Thus, the COMPARE LOGIC is concerned only with the characters in memory stored for even or odd columns but not both. Hence, while the print fingers are moving to even print positions, only the characters stored for even print positions will be considered. Likewise, the TSR double pulse will occur such that at the second pulse, an even-stored character will be at the COMPARE LOGIC when the print fingers are moving to even print positions. An odd-stored character will be there when the print fingers are moving to odd positions.

The COLUMN COUNTER will likewise increment steadily by two's during the print cycle. The TIMING CC LOGIC now increments on each TCC pulse which occurs once each 8.75 μs. Since it increments by two each time, it is kept in synch with the ONE LINE MEMORY as was true in the load cycle. The signal TCC will be sent in the print cycle according to the logic equation:

$$Ø2 = TCC = \overline{(\overline{INFIRE} + \overline{LFF})} \text{ AND } \overline{RCC}$$

The RESET CC LOGIC will send RCC to reset the COLUMN COUNTER according to the equation:

$$RCC = \overline{INFIRE} \text{ AND } CC = 132$$

Hence, the COLUMN COUNTER outputs (CC2 through CC8) will have an even count being sent to the FIRE ALGORITHM LOGIC for each character being considered again at the COMPARE LOGIC.

The TIMING CC LOGIC circuit will also receive the DEF (even finger pulse) and the DOF (odd finger pulse). Signal DEF will come true when print fingers are moving to even print positions and DOF will come true when moving to odd print positions. This will cause the signal INXO to be true during even finger time and false at odd finger time. The INXO pulse will be sensed by the TSR circuitry such that TSR timing will change for each finger time. When INXO is true, TSR at the ONE LINE MEMORY will double pulse to have even-stored characters at the COMPARE LOGIC. When INXO is false, TSR will cause odd-stored characters to appear at the COMPARE LOGIC.

DATA PROCESSING – THE PRINT CYCLE (FIGURE 4-20, SHEET 2)

The BELT COUNT circuit on the LOG board will count upwards from 32 through 127 and then reset to 32. It will increment upwards on each DEF pulse. The DEF pulse will arrive when the print fingers pass over the even print positions and start to the odd positions. The BELT COUNT will be sent to the FIRE ALGORITHM LOGIC on lines BC1 through BC8. This will occur at T64 time and the FIRE ALGORITHM LOGIC will hold this count until the next T64 time. The T32 time input will cause the BELT COUNT to increment if DEF is true. The FR (FONT RESET) signal will be sent when light is blocked from the even and odd photocells simultaneously. This will happen when the print belt reference tabs are in front of both photocells. The FR signal will reset the BELT COUNT to 32.

Belt Count Circuit

The print fingers are inserted into the print belt in the order used in the ASCII code. That is, the printable graphics of the ASCII code are decimal 32 through 127. Likewise, the print belt has the print finger for character 32 inserted preceding the print finger for 33 etc., through 127. This gives 96 print fingers in one print set or font. If the print belt had two fonts of 96 fingers per font, this would mean that 192 print fingers are inserted in the print belt. Each font is separated by a reference tab that causes the FR signal to be generated on the LOG board. The FR signal tells the LOG board to consider the next print set. It does this by resetting the BELT count to 32. The position of the photocell and the print finger spacing is such that when the BELT COUNT is 32 the 32 character print finger is in front of print position one. The finger spacing in the print belt is such that the 33 character print finger is in front of print position three and so on. When the BELT COUNT is 65, it means that print finger character 65 is in front of print position one. Therefore, the 66 character print finger is in front of position 3 and so on. The A finger and B finger are in front of print positions one and three respectively in this example. Thus, the BELT COUNT circuit will keep track of where the print fingers are in relation to print columns or positions.

The BELT COUNT circuit will also provide a CC1 output which will be true when print fingers are moving to odd print positions (DOF) and false when moving to even print positions (DEF). This will give the odd count to the column count inputs to the FIRE ALGORITHM LOGIC when odd-stored characters and columns are being considered for printing.

Fire Algorithm Logic

The FIRE ALGORITHM LOGIC will perform an addition of the BELT COUNT outputs BC1 through BC8 and the COLUMN COUNTER outputs (Figure 4-20, sheet 1) CC1 through CC8. The addition algorithm for a two font belt is as follows:

$$BC + \frac{CC}{2}$$

The column count will be divided by two first and then added to the belt count. If the output from the FIRE ALGORITHM LOGIC is between 32 and 127, this output will be compared with the character then present at the COMPARE LOGIC. If the BC + CC/2 = CH, a compare is the result. An output pulse will then be sent to the FIRE CKT.

If the output from the FIRE ALGORITHM LOGIC is $\geq$ 127, the binary equivalent of 96 will be subtracted from the BC + CC/2 and then compared.

Fire Circuit

When the COMPARE pulse arrives at the FIRE CKT, the output FIRE will result. FIRE will be strobed out of the FIRE CKT when FS comes true. The INHIBIT and HLIM inputs must be off. When the FIRE signal arrives at the FOH FEH GEN circuit, an FH pulse will be sent. Also, if CC1 is true (odd column) FOH will be sent to the LHD/ODD PWB. If CC1 is false, FEH will be sent to LHD/EVEN.

Erase Circuit

The outputs from the ONE LINE MEMORY are sent to two places on the LOG board other than the COMPARE LOGIC. The CH1 through CH7 outputs will also be sensed at the ERAS CKT. If the character is a control code or a space code the ERAS CKT will output the signal INHIBIT which when sensed at the FIRE CKT will cause the FIRE signal to be inhibited for that character time. Also, the output ERAS pulse will be sent to the DATA MULTIPLEXER (Figure 4-20, sheet 1) to erase that character from memory. This will happen only in the print cycle (INFIRE to the ERAS CKT is off). During the load cycle, the INHIBIT signal will be true thereby inhibiting all FIRE pulses. The FIRE pulse will strobe out the signal ERAS for the printing characters.

Null Detect Circuit

The outputs CH1 through CH7 will also be sent to the NULL DETECT circuit. The NULL DETECT circuit will scan the ONE LINE MEMORY outputs CH1 - CH7 as data is being read out. Assume that the print fingers just crossed the even print positions. The signal DEF will set the NULL DETECT circuit. If there are any characters in memory, a logic 1 on any input (CH1 - CH7) will reset the NULL DETECT circuit. If there are no characters in memory, the NULL DETECT circuit will remain set. When the DOF pulse arrives it will cause the output PC signal to be generated ending the print cycle. The GTD input will cause a delay in sending PC. This will occur when the Corresponder is in a rate limiting mode during the print cycle.

3-Font Detect Circuit

The 3 FONT DTECT circuit is used when a 3-font print belt is used. With a 2-font belt, the signal FR will set the 3 FONT DTECT circuit. When the BELT COUNT reaches 100, the BC=100 signal will reset the 3 FONT DTECT. No output will result from the circuit. When a 3-font belt is used, the FR pulse will set the 3 FONT DTECT circuit. The next FR pulse will arrive when the BC=95. In that case the FONT 3 output will be sent to the FIRE ALGORITHM LOGIC.

When the FIRE ALGORITHM LOGIC receives the FONT 3 signal, it will change the algorithm to conform to the following equations:

IF	THEN COMPARE
$32 \leq (\frac{CC}{2} + BC) \leq 95$	$BC + \frac{CC}{2} = CH$
$96 \leq (\frac{CC}{2} + BC) \leq 159$	$BC + \frac{CC}{2} - 64 = CH$
$(\frac{CC}{2} + BC) \geq 160$	$BC + \frac{CC}{2} - 128 = CH$

Hi Lo Decode Network

The COLUMN COUNTER outputs CC1 through CC8 are also sensed at the HI LO DECODE network on LOG. As each column (print position) is read from the counter, the HI LO DECODE network will electronically switch open one HI line and one LO

line. These outputs will be sent to the LHD boards. The outputs will be used in conjunction with FOH or FEH on the LHD boards to place a ground on the particular column solenoid associated with the column being read from the counter. If the CC1 - CC8 count from the COLUMN COUNTER is 38, then HI line H32 and LO line H6 will be opened momentarily. This will select coil number 38 on the even LHD board and coil 39 on the odd LHD board. The signal FEH will cause coil 38 to receive a ground and FOH will cause 39 to receive a ground. Notice that H32 + H6 = 38.

As the print belt moves from even columns to odd columns, odd coils will be grounded if the print belt is in the correct position for the characters being read from memory to print in the correct columns. This is determined by the algorithm logic. Up to eight odd columns can receive grounds during this time. When the print fingers are almost directly in front of the odd hammers, a high voltage pulse will be sent to all odd hammer solenoids. Those solenoids that were grounded will be activated thereby printing up to eight odd print positions simultaneously. The same sequence for printing even columns takes place when the fingers are moving from odd columns to even columns.

HVS TIMING (FIGURE 4-20, SHEET 2)

The Photocell PWB on the hammerbank subassembly will send electronic pulses from its photocells to the PSR PWB. The PSR board, after amplifying the two photocell outputs will send these outputs to the LOG board as EF and OF. These signals will be sent to the PHOTOCELL DIFF network. This circuit will output the DEF and the DOF pulses at the proper time. The DF pulse will be sent for each DEF and DOF pulse. The FR signal will be sent when EF and OF occur simultaneously (light blocked from both photocells caused by passing of the reference finger).

Low Speed Detect Circuit

The DEF and DOF pulses will be sent to the LOW SPEED DETECT circuit, the EVEN COUNTER, and the ODD COUNTER. The DEF pulse will enable the even counter to start counting. It will stop counting and reset when DOF arrives. If the count in the even counter reaches 288, the signal $\overline{\text{LOSP}}$ will be sent from the LOW SPEED DETECT circuit. This represents a time of 288 x 8.75 µs = 2520 µs, indicating an approximate decrease in print belt speed of 12 percent. The ODD COUNTER will function in the same manner. The $\overline{\text{LOSP}}$ signal will be sent to the ALARM LOGIC.

Drive and Commutate Signals

The EVEN COUNTER and ODD COUNTER will output three signals each. The EVEN COUNTER will send the $\overline{\text{EDR}}$ signal (even drive) and the $\overline{\text{ECT}}$ signal (even commutate). These signals (refer to Figure 4-18) will be sent to the EVEN HVS to develop the high voltage drive pulse to the even hammerbank solenoids. The EVEN COUNTER will also send the $\overline{\text{COMP}}$ signal during the time that the fingers travel from odd print positions to even print positions. The ODD COUNTER will do the same. The $\overline{\text{COMP}}$ signal will vary in time duration with small fluctuations in print belt speed. The drive and commutate signals are of fixed pulse duration. If the print belt slows down, it will take more time before the $\overline{\text{EDR}}$ or $\overline{\text{ODR}}$ signals will be sent. The total time to ground up to eight even or odd solenoids, drive the hammers, and turn off the HVS switches is 2250 µs. It is during $\overline{\text{COMP}}$ time that coils are being grounded. Drive time causes hard copy printing and commutate time turns off all hammer solenoids previously turned on.

Hit Limit Counter

For each coil being grounded, an FH pulse is sent from the FOH-FEH GEN circuit. This pulse when sensed at the HIT LIMIT 30 COUNTER will cause the counter to increment upwards one count. The DF signal will reset the counter. If the count ever reaches the maximum of eight, the output signal HLIM will be sent to the FIRE CKT to inhibit the generation of any more FIRE signals until the counter resets on the next DF pulse. This process will assure that no more than eight hammer solenoids will be driven simultaneously. This will prevent drawing more than the rated current from the +109V power supply.

If the +109V power supply drops significantly below its rated voltage, the signal HVL from the PSR board will cause HLIM to be sent prohibiting hammer solenoids from being grounded. The same process will hold true if COMP is false, ML (from the MOTOR CONTROL LOGIC) is false or if the Corresponder is feeding paper (FDG is true). Straps J2 and J3 are factory installed straps and should not be changed.

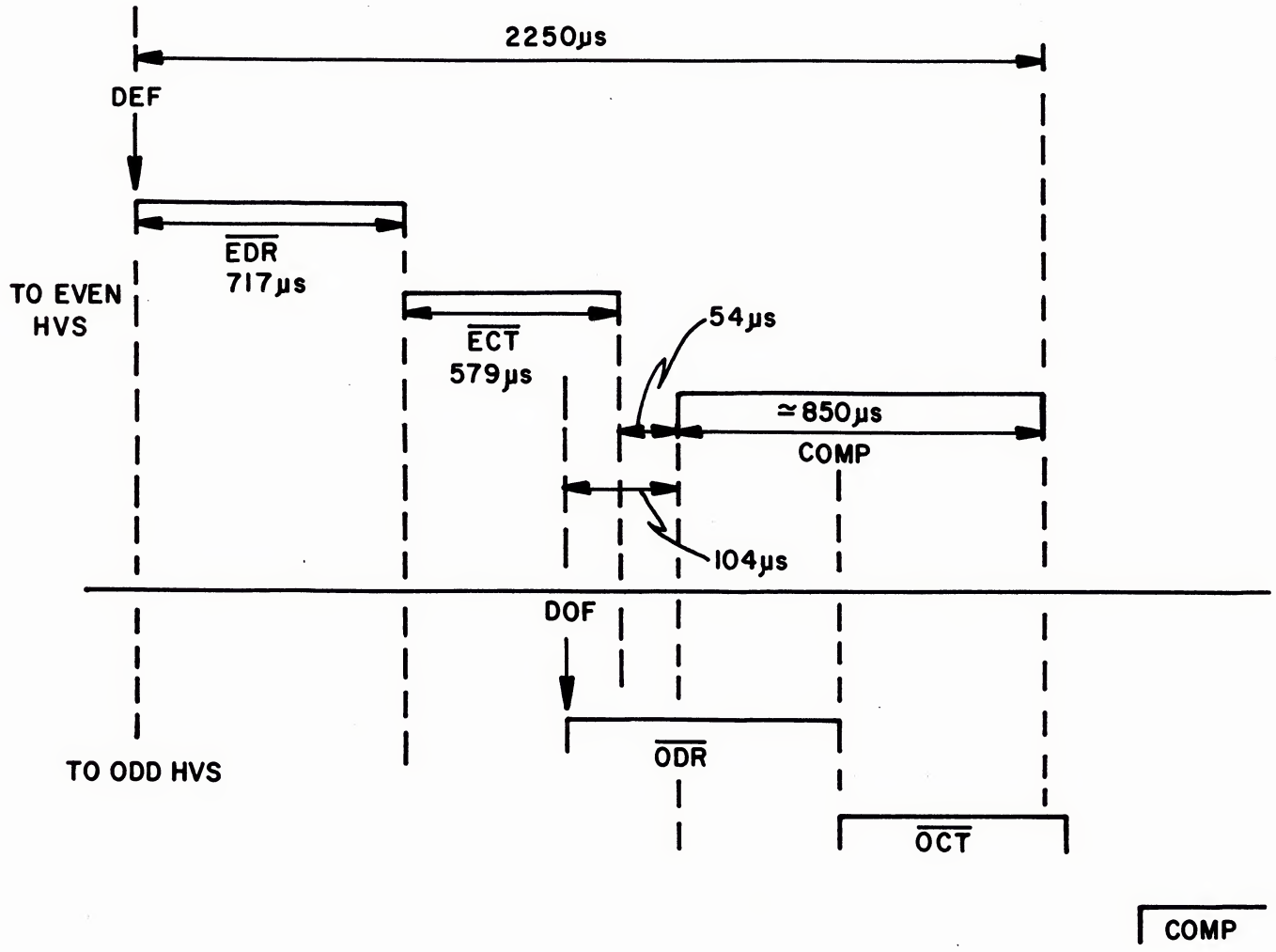


Figure 4-18. HVS Drive and Commutate Cycle

Rate Limit Counter

The RATE LIMIT ÷ 64 DOWN COUNT circuit is activated by placing a strap on the LMB board. This will cause the signal RTCL to release the DOWN COUNT OUTPUT. For every sixty-four T32 timing pulses, the DOWN COUNT will pulse once. With nothing being printed the UP/DOWN COUNTER 896 will be at zero. As printing starts to occur, FH pulses will count the UP/DOWN COUNTER upwards. For some printing formats, it is possible to print at a printing speed that is in excess of the rated print speed of the Corresponder. The UP/DOWN COUNTER 896 will average the counts (up and down) over 5 to 10 print lines. If the counter reaches the number 896, the signal GTD (governing time delay) will be sent to the NULL DETECT circuit. This will cause a delay in sending PC even though the ONE LINE MEMORY is empty. The effect is to limit the average rate to 510 CPS.

MOTOR CONTROL AND ALARM LOGIC (FIGURE 4-20, SHEET 2)

When the MOTOR ON pushbutton is pressed on the control panel or when the INT responds to a motor-on command from the data source, the signal $\overline{\text{MONX}}$ will cause the signal MTD to be generated from the MOTOR CONTROL LOGIC. This will reset the ALARM LOGIC. The momentary MTD pulse will

also cause the signals $\overline{\text{MTRL}}$, $\overline{\text{MTRR}}$, $\overline{\text{MTR}}$ and ML to be generated. The $\overline{\text{MTRL}}$ signal will be sent to the control panel to light the MOTOR-ON LED. The $\overline{\text{MTRR}}$ signal will cause the motor relay to energize on XPS and the motor will start. The $\overline{\text{MTR}}$ signal will be sent to the INT board.

Motor Control

When the MOTOR OFF pushbutton is pressed on the control panel, or when INT responds to a motor off command from the data source, the signal $\overline{\text{MOFX}}$ will reset the $\overline{\text{MTR}}$, $\overline{\text{MTRL}}$, and $\overline{\text{MTRR}}$ signals. The motor will turn off and the MOTOR ON LED on the control panel will turn off. The MOTOR CONTROL logic will also reset if the $\overline{\text{ALRM}}$ signal is sent. The ML output will be sent to the HIT LIMIT 8 COUNTER when MTD is true (motor just starting) or when the motor is off ($\overline{\text{MTR}}$ is true) or when the $\overline{\text{ALRM}}$ signal is true.

Alarm Logic

When the $\overline{\text{FLTX}}$ signal ($\overline{\text{FLTX}}$ = LOW·PAPER or +109 VDC is crowbarred) arrives at the ALARM LOGIC, the signals $\overline{\text{ALRM}}$ and $\overline{\text{ALML}}$ are sent to INT and the control panel respectively. This will cause the INT board to indicate the alarm status to the data source and the control panel to indicate the condition to the operator by lighting the ALARM LED. When any of the PSR low voltages are below their rated value, LV will come true turning on the $\overline{\text{ALRM}}$ and $\overline{\text{ALML}}$ outputs. The $\overline{\text{ALRM}}$ signal will also be sent to the MOTOR CONTROL Logic.

When a slow speed on the print belt is detected, the $\overline{\text{LOSP}}$ signal will also cause the ALARM Logic to set. Finally, when CLP comes true after $\overline{\text{LFS}}$ has turned off at the CLP GEN (Figure 4-20, sheet 1), and the $\overline{\text{LFG}}$ signal has not turned off, an ALARM output will result.

CORRESPONDER MAIN TIMING (FIGURE 4-20)

The Corresponder timing signals are derived initially from a 3.2 MHz crystal clock oscillator that divides the frequency by 4 (800 kHz) and then develops the phase 1 and phase 2 clock frequencies. The phase 1 and phase 2 clocks will go to all LOG board LSI chips. The two clock outputs are fused (F1 and F2). If either fuse opens, a fault circuit will be triggered. This will cause a board mounted LED to illuminate. The oscillator will also send out the FS (fire strobe) signal at phase 2 time. Finally, X TIME pulses from the phase 1, phase 2 x-timer will be sent to the TSR GENERATOR.

TSR Generator

The TSR GENERATOR circuit will output double pulses continuously in the print cycle. It will output single pulses for each character in the load cycle. The INXO input will cause TSR to double pulse in the print cycle such that odd-stored characters will be at the COMPARE circuit at odd compare time and even-stored characters will be at the COMPARE circuit at even compare time.

T-Time Clock

Finally, the T-TIME CLOCK will output a series of T-timing pulses, most important of which are T32 and T64. All timing signals shown are illustrated in Figure 4-19.

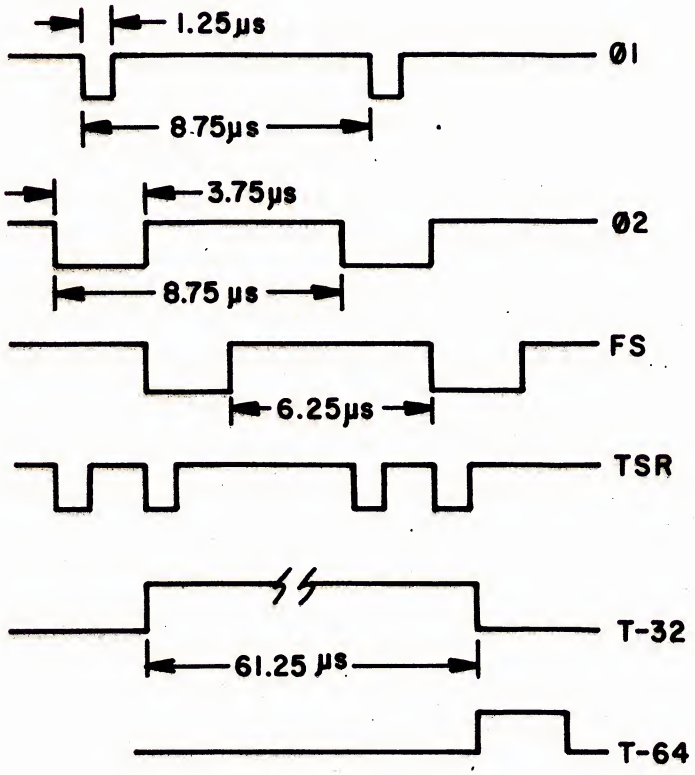


Figure 4-19. Corresponder Timing Signals

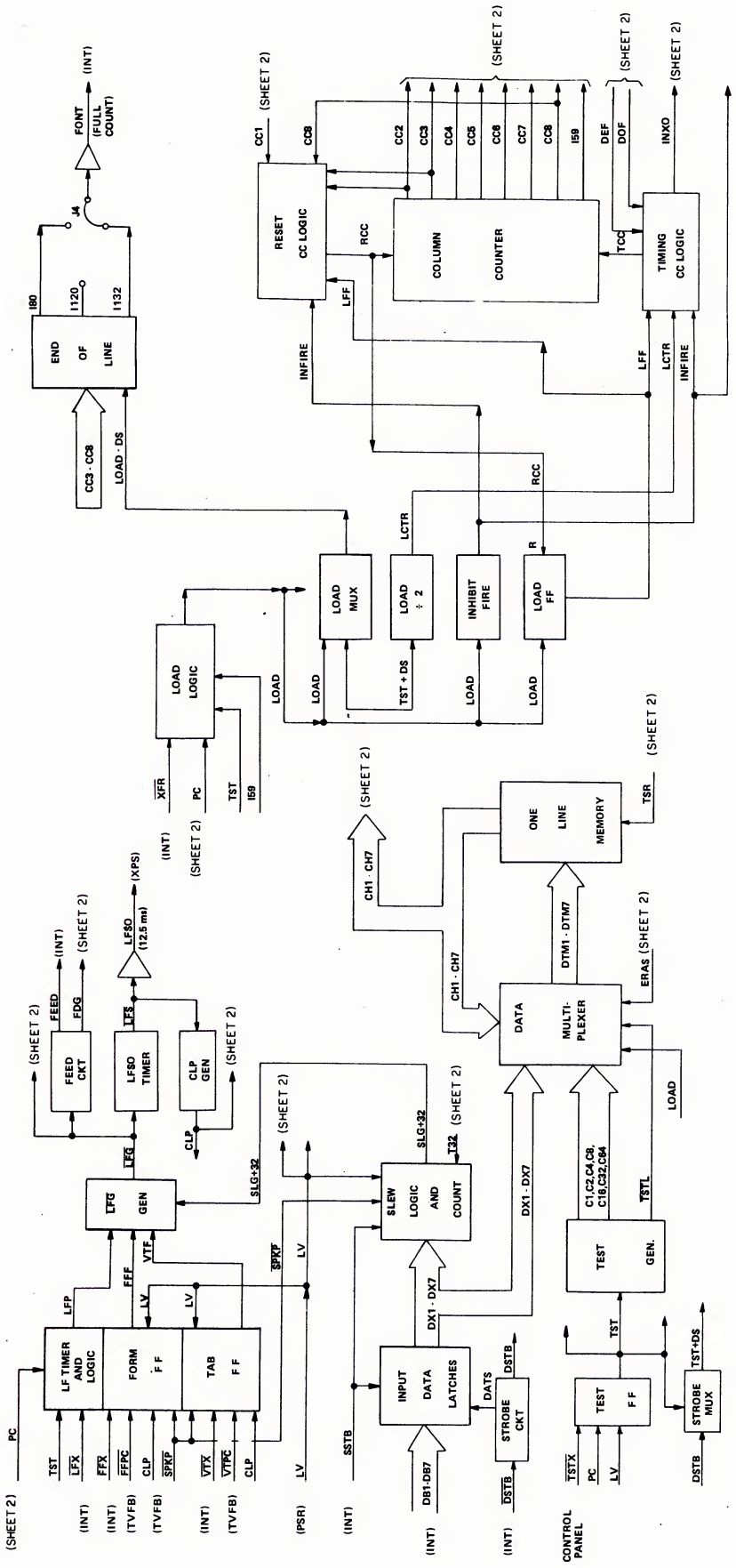


Figure 4-20. Logic Board (LOG) Functional Block Diagram (Sheet 1 of 2)

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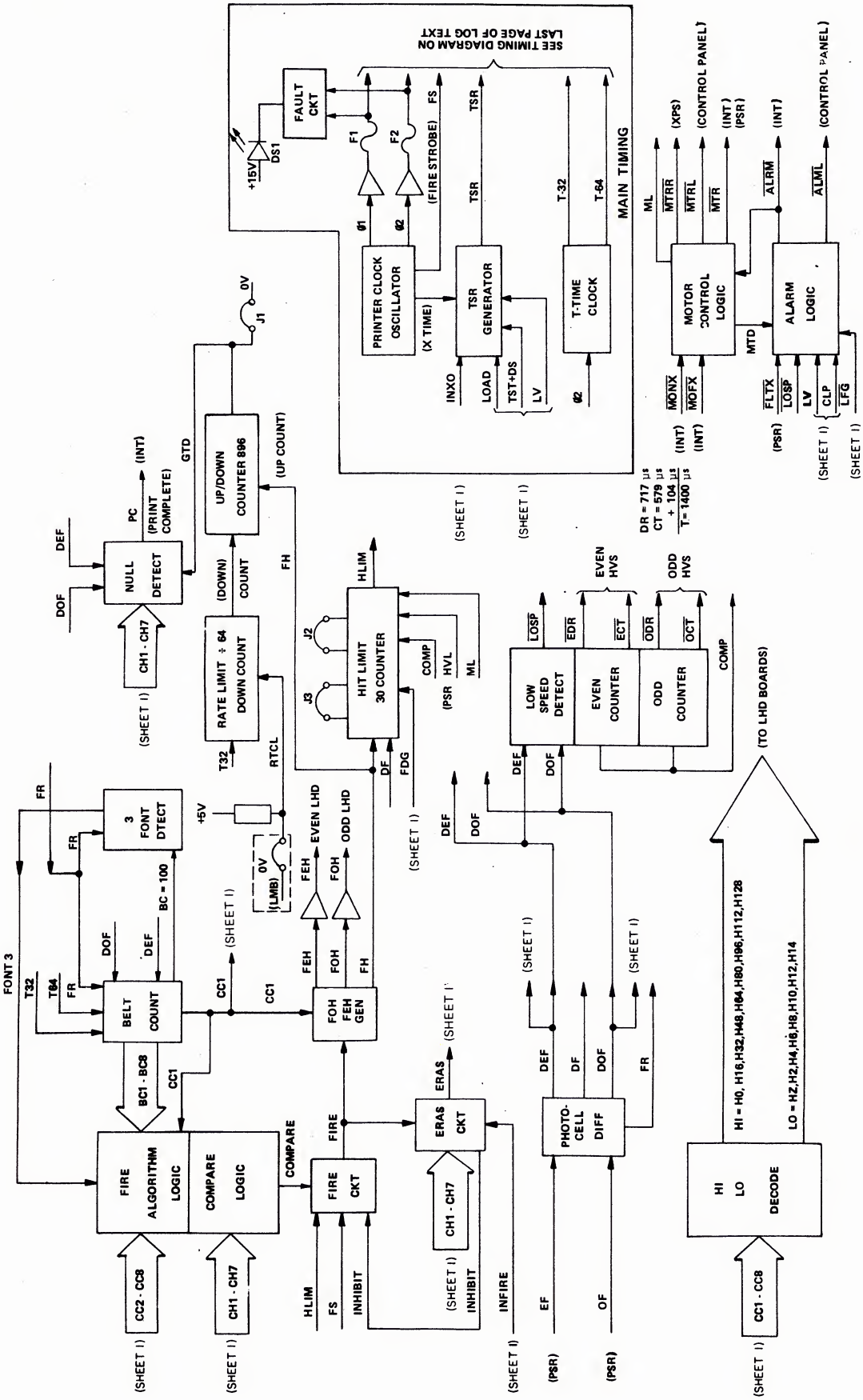


PLL-5061

Figure 4-20. Logic Board (LOG) Functional Block Diagram (Sheet 2 of 2)

POWER CONTROL BOARD (XPS) 44B418210

FUNCTION

The XPS/4 board (Figure 4-21) receives power from the 117V AC power source and, through the power transformer located on the main frame, supplies low voltage, unregulated power to the Corresponder. In addition, the XPS board contains all power supply fuses, the AC line filter, motor circuit, and linefeed servo driver.

FUSES

F1–4A MDA – 157V Supply
F2–5A MDX – 10V Supply
F3–2A MDX – +25V Supply
F4–2A MDX – -25V Supply
F5–7A MDX – Input Power

CAUTION

For optimum protection against short time heavy overloads, F5 must be the type of 7A MDX fuse having a single, heavy strap to the element instead of two small wires.

STRAPS

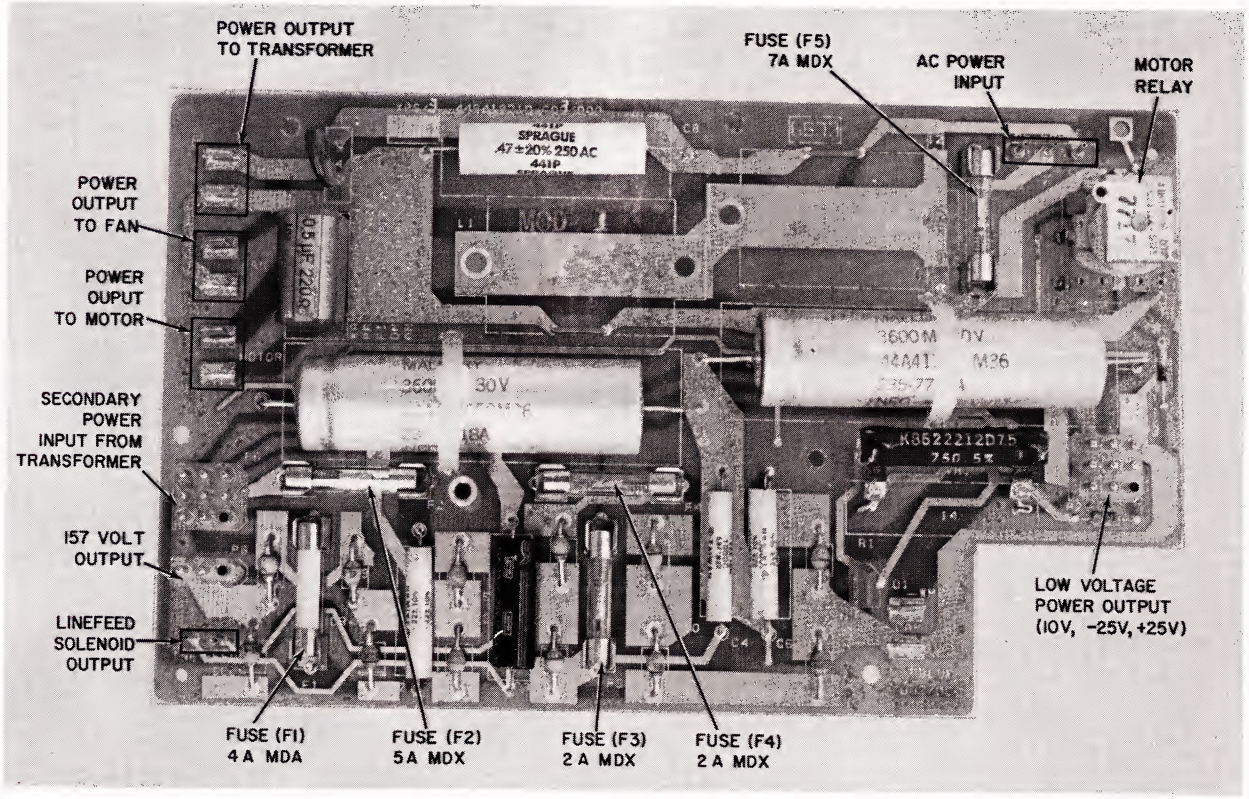
None

TEST POINTS AND WAVEFORMS

None

PRINCIPLES OF OPERATION (FIGURE 4-22)

Power enters the Corresponder via the power cord and goes through the cover interlock switch and power switch located on the right rear of the Corresponder. Both of these switches must be closed before power is provided to the XPS board.



PLH-7038

Figure 4-21. Power Control Board (XPS)

The incoming AC power (as shown in Figure 4-22) passes through the line filter inside the AC switch box. The line filter prevents line generated RFI from entering the power supplies and also prevents unit-generated RFI from conducting back into the AC line. The fuse F5 protects the 117V AC primary circuit.

The XPS board also contains the motor circuits. The Corresponder motor is fed from the line side of the RFI filter. The motor circuit includes the motor relay and associated circuitry to reduce voltage transients generated by the relay contacts. Thermal overload protection is internal to the motor.

The 157 volt power supply provides power to the +109 volt regulator found on the Power Supply Regulator (PSR) board. Fuse F1 provides protection against failure of the +109 volt regulator.

The low voltage power supplies provide unregulated low voltage power to the low voltage regulators on the PSR board. The +25 volt, -25 volt, and 10 volt unregulated power supplies the +15 volt, -15 volt, and +5 volt regulators respectively. In addition, -25 volt unregulated power is also used to supply the -12 volt regulator.

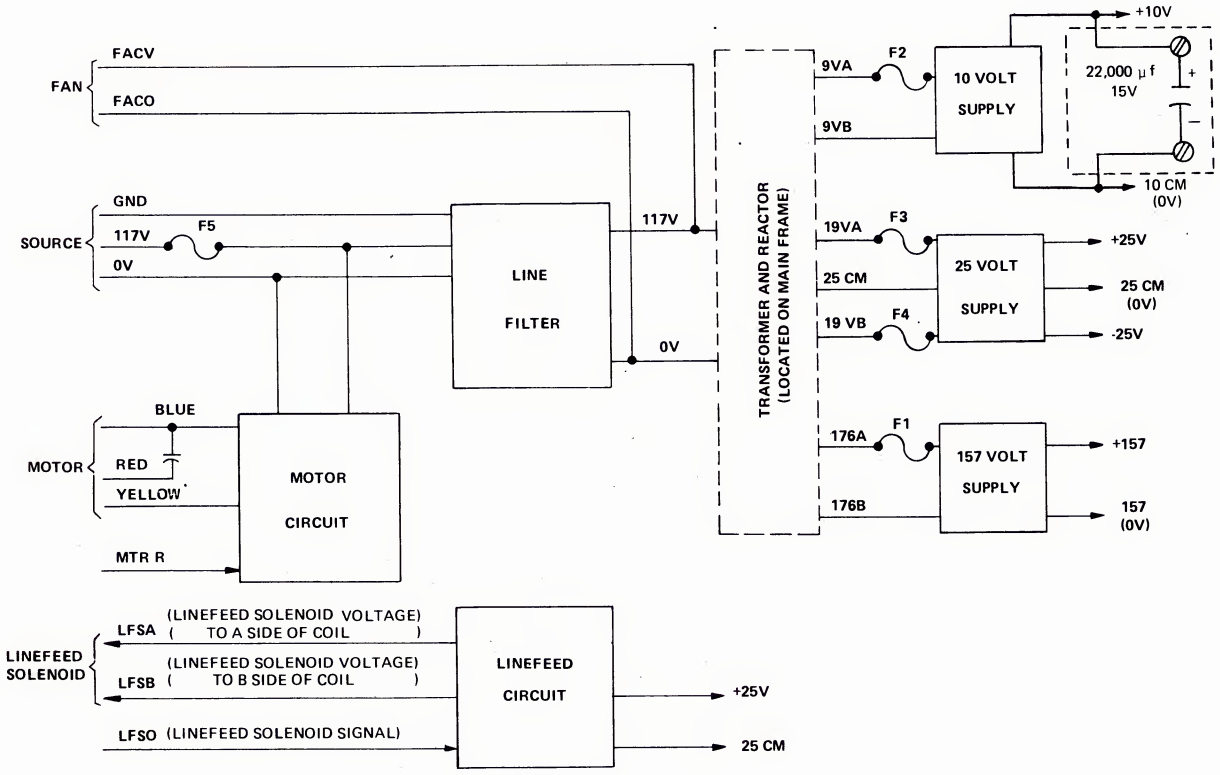


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Figure 4-22. Power Control Board (XPS) Functional Block Diagram

INTERFACE BOARD (INT/2) 44C417522

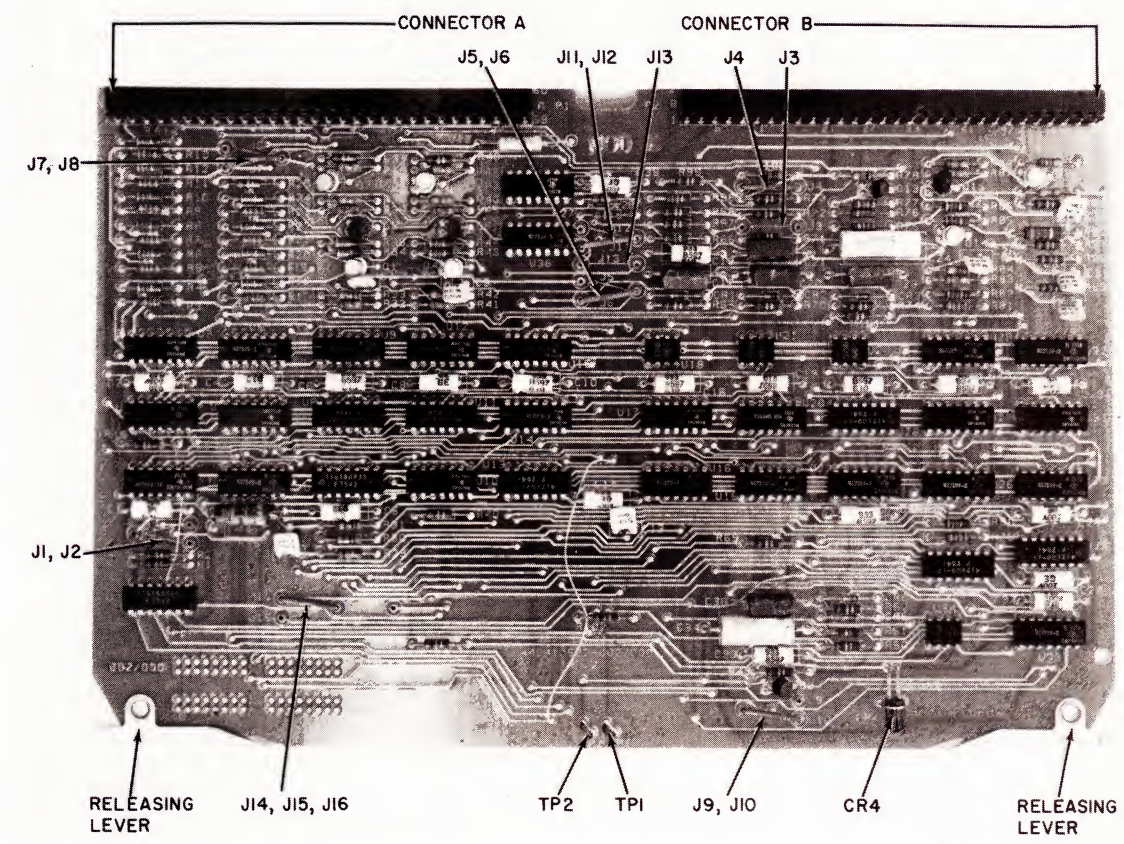
NOTE

Many special interfaces are available for TermiNet 510 Corresponder. Information on these interfaces is included in separate manuals (see page ii).

FUNCTION

The Interface (INT) Board (Figure 4-23) interfaces the Corresponder with the data source (central computer system, communications buffer, or other intelligent data system device). Because of this, INT boards will differ depending upon the specific hardware or software requirements of the system in which the Corresponder is employed. For specific information on a particular system interface, refer to the separate INT board documentation for that system. However, there are many functions that are identical and common to all INT boards. Therefore, even though the following information describes the INT/2 board, much of it is also applicable to other interfaces.

The INT/2 board receives all data and control signals through a 25-pin connector. It contains logic to perform a parity check. The board also contains decode circuitry to execute paper control commands, i.e., line feed, vertical tabulation, form feed, or slew. Finally, the INT/2 board contains interface logic for other control commands and status signals such as bell and low paper.



PLH-7037

Figure 4-23. Interface Board (INT)

FUSES

None

STRAPS

J1 In, J2 Out	Check for Even Parity.
J1 Out, J2 In	Check for Odd Parity.
*J1 Out, J2 Out	Do not check for Parity.
J3 In, J4 Out	M+F signal high for paper motion.
*J3 Out, J4 In	M+F signal high for Motor On.
J5 In, J6 Out	No response to Form Feed, Vertical Tab, or Vertical Slew commands.
*J5 Out, J6 In	Normal Response to Vertical Format Codes.
J7 In, J8 Out	Input Data Strobe is positive going
*J7 Out, J8 In	Input Data Strobe is negative going.
J9 In, J10 Out	READY is high when Corresponder cannot receive data.
*J9 Out, J10 In	READY is low when Corresponder cannot receive data.
*J11 In, J12 Out	Delete Code ignored.
J11 Out, J12 In	Delete and Underline Codes ignored (used with 64 character subset option).
J13 In	No character printed when Parity Error detected.
*J13 Out	= printed when Parity Error detected.
*J14 In, J15 Out	PER signal reset by print action.
J16 Out	VFU code parity error not responded to.
*J14 Out, J16 In, J15 Out	PER signal reset by print action. VFU code parity error does set PER signal.
J14 Out, J16 Out, J15 In	PER signal reset by next character received without a parity error.

*Standard strapping configuration.

TEST POINTS

TP1 and TP2 — When shorting TP1 and TP2 together, the test generator will be activated and the motor will turn on.

PRINCIPLES OF OPERATION (FIGURE 4-24)

In typical applications, the 25-pin data connector on the Corresponder will have those signals as shown in Table 4-2.

TABLE 4-2
INTERFACE SIGNALS

PIN NO.	SIGNAL NAME	TO PRINTER	TO DATA SOURCE
1	Frame Ground (FRAME)		X
2	Data Bit 2 (D2)	X	
3	Data Bit 3 (D3)	X	
6	Ready to Printer (RTP)	X	
7	Signal Ground (0V)		X
8	Data Bit 4 (D4)	X	
9	Interrupt (INT)		X
10	Here Is (ANS)		X
11	Data Bit 1 (D1)	X	
12	Data Bit 6 (D6)	X	
13	Character Acknowledge (ACK)		X
14	Data Bit 7 (D7)	X	
15	Fault		X
16	Data Bit 8 (D8)	X	
17	Paper In Motion (M+F)		X
18	Data Bit 5 (D5)	X	
20	Printer Ready (RFP)		X
21	Parity Error (PER)		X
22	Bell (BEL)	X	
23	Data Transfer (TRAN)	X	
24	Data Strobe (STB)	X	
25	Low Paper (LPFP)		X

Note - Pins 4, 5, and 19 not used.

The Corresponder, as shown in Figure 4-24, will receive one full line of data at the maximum transfer rate of 60,000 characters/second. After the full line of data has been received by the LOG board from the INT board, the LOG board will send a busy signal to the data source via the INT board. During this busy time, the Corresponder will execute any paper feeding commands received via the first character received in the line of data, print the line of data, and execute a linefeed. While the linefeed is being executed, another line of data may be entered from the data source.

The actual data will enter the data line driver on the INT board in parallel over the eight lines $\overline{D1}$ - $\overline{D8}$. The data will be sent from the data line driver to the parity error detect circuit and the decode circuit as $\overline{D1}$ - $\overline{D8}$. Additionally, the data will go to the LOG board, as $\overline{DB1}$ - $\overline{DB7}$.

If a character is received having a parity error, the parity generator will generate the PER signal to inform the data source of the erroneous character. Depending on the strapping arrangement selected, the PER signal can be reset in any one of the following ways:

1. When print action is initiated. A parity error in the paper control code will cause the code to be ignored but will not generate a PER signal.

2. When print action is initiated. A parity error in the paper control code will cause PER to be generated.

3. When the next character is received without a parity error. This arrangement permits the data source to immediately retransmit characters received in error to create a correct printed copy.

Another strapping option will cause a parity error to either be ignored by the Corresponder, or to cause the data line driver to force the output lines $\overline{DB1}$ - $\overline{DB7}$ (going to LOG) to an ON condition. This will in turn cause the parity error symbol " ⩵ " to be printed.

The parallel data $\overline{D1}$ - $\overline{D8}$ will be sent to the decode circuit as well as to the parity error detect circuit.

The first character in each line of data is concerned with controlling paper movement; however, if the motor is off, the first character may also be used to initiate the motor on sequence. The decode circuits are enabled for only the first character by the first character (FC) enable signal. Along with each character, a strobe signal is received from the data source. A strapping option is provided to allow either a negative or a positive going data strobe. The data strobe passes through a 1 μs delay circuit and triggers a 5 μs one shot. This 5 μs signal is called DS. Assuming that the first character is a valid paper moving code, the decode circuit will output the appropriate paper movement command (LF, FF, VT, or slew) to the Corresponder. A strapping option is provided to disable the special VT and FF codes and the slew option. This will cause the VT and FF or FF and LF code to result in a line feed only. A series of gating circuits are used so that only the appropriate decoded signal will cause the desired paper action to occur. The FC signal is also sensed by the slew gate along with $\overline{D7}$. If D7 is a logic 1 (for the first character), the Slew Strobe (SSTB) will turn on. During first character time, the Data Strobe to Buffer ($\overline{DSTB}$) which is used to clock data on lines $\overline{DB1}$ - $\overline{DB7}$, is inhibited. Also, DSTB will be inhibited anytime D6 and D7 are both a logic 0 (control character). This means that no control codes or paper control codes are able to enter the Corresponder memory. Whenever the first character is a paper slew command ($\overline{DB7}$ = logic 0), the Slew Strobe (SSTB) will be sent to the LOG board so that $\overline{DB1}$ through $\overline{DB6}$ of that character can be clocked into the slew counter. This in turn will determine how many lines (up to 63) of paper will be slewed. A strapping option is provided which causes delete codes to be ignored. Also, when the 64 character subset option is used, a strapping option is available to cause Delete and Underline codes to be ignored.

CONTROLS

The INT board contains several control circuits to control Corresponder action from the data source or to inform the data source of certain Corresponder actions. These circuits will vary depending on which system and corresponding INT board is used. Therefore, the following control circuits discussed will be as used only on the INT/2 board.

TRANSFER (XFR) AND READY FROM PRINTER (RFP)

The Transfer signal (XFR) is derived from the TRAN signal (pin 23) which is sent to the Corresponder from the data source. The XFR signal, in turn, enables the Ready From Printer (RFP) signal (pin 20) provided that the alarm, low voltage, or test conditions do not exist. A strapping option is available to make RFP either high or low when the Corresponder cannot receive data. The RFP signal is used to inform the data source that the Corresponder is ready for data. The RFP signal is used to light the READY LED indicator on the INT/2 board. The RFP signal will cause the data source to begin transferring data to the Corresponder. When a full line of data has been clocked into the Corresponder memory, the FC signal derived from Full Count (FCNT), will turn off XFR. This causes RFP to turn off, making the data source go busy until the previous line of data has been printed. After the line of data has been printed, the IPC signal (derived from PC) will enable XFR and RFP to again signal the data source to start transferring more data. When the data source has less than a full line of data to send, the data source will send the signal TRAN following the last character in the data line. This will turn off SFR and RFP causing the received data to be printed.

Motor On

The motor can be automatically turned on by receipt of data or the TRAN signal, or it can be turned on manually with the pushbutton switch on the front panel. Since the paper control character may be received by the Corresponder when the motor is off, this character may be used to initiate the motor on sequence. MON signals from the interface are ignored.

Motor Off

The motor will turn off approximately one minute after the last printing action occurs, or it can be manually turned off with the pushbutton switch on the front panel. MOF signals from the interface are ignored.

Bell Signal (BEL)

The Corresponder bell will sound upon receipt of a signal on the BEL input line (pin 22) of longer than 2 μs in duration.

For multiple bell ringing, the pulses from the data source must be at least 500 ms apart.

Ready to Printer (RTP)

When the RTP lead (pin 6) from the interface to the Corresponder is a logic 1, the READY indicator on the Corresponder front panel will light.

Interrupt (INT)

The signal INT (pin 9) will be sent to the data source when the INTERRUPT pushbutton is pressed on the Corresponder front panel.

Answerback (ANS)

The signal ANS (pin 10) is sent to the data source when the HERE IS pushbutton is pressed on the Corresponder front panel.

Low Paper (LPFP)

The signal LPFP (pin 25) is sent to the data source when the low paper switch on the Corresponder senses the absence of paper.

Acknowledge (ACK)

The signal ACK (pin 13) is sent to the data source after each character has been received by the Corresponder logic board. This signal will limit data transfer to one character every 14 to 20 μs. A maximum data transfer rate of 60,000 cps is possible when the ACK signal is not used.

Motor or Feeding (M + F)

The M + F signal (pin 17) is used to signal the data source on the status of the Corresponder. Depending on the strapping arrangement used on the INT/2 board, the data source can be informed through M/F lead when paper is in motion or when the motor is off.

Fault

A fault signal (pin 15) is generated and sent to the data source when an alarm condition exists, or Corresponder voltage is too low.

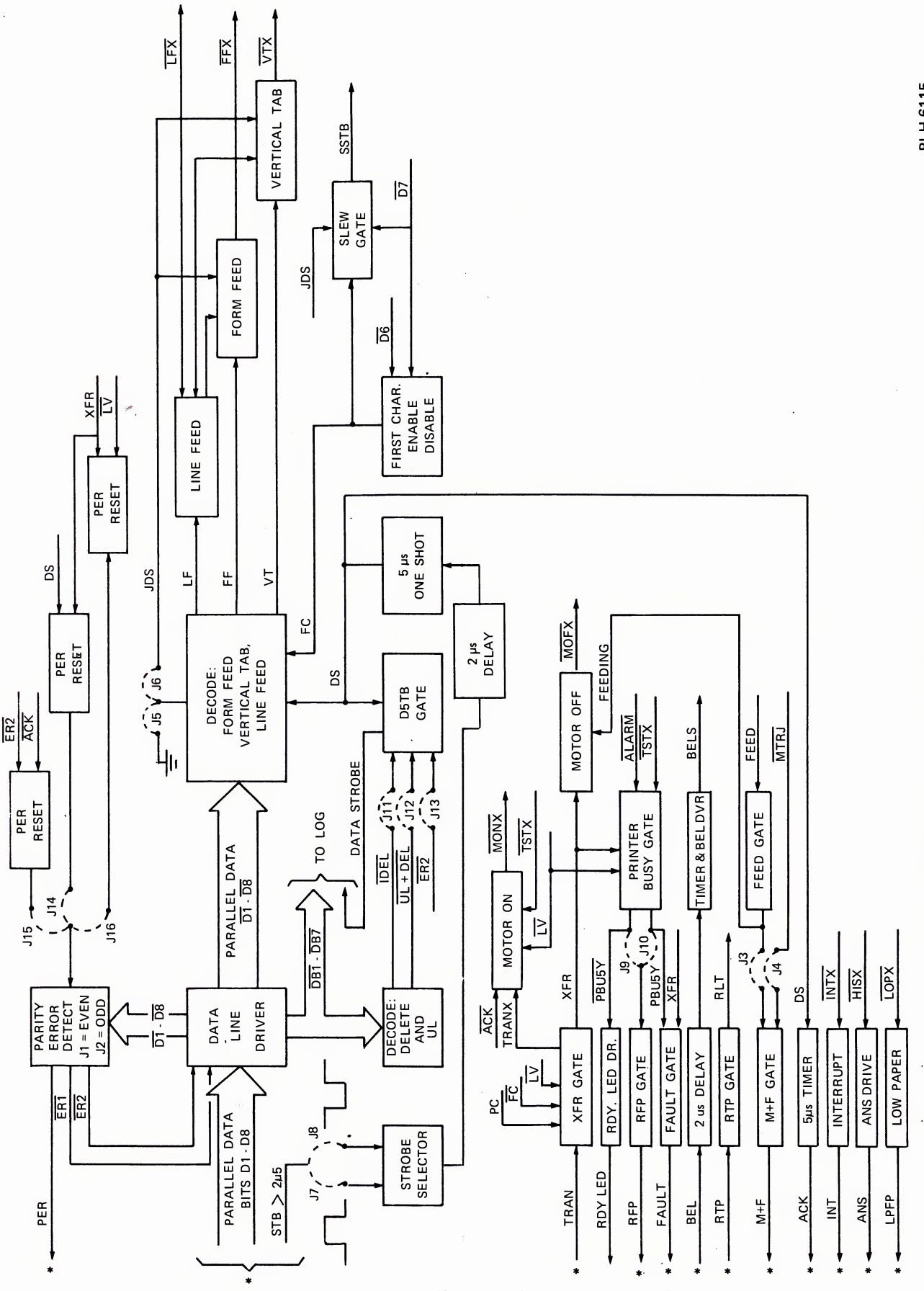


Figure 4-24. Interface Board (INT/2) Functional Block Diagram

RIBBON AND PAPER FEED CONTROL (RFC) 44A430094-G09*

FUNCTION

The RFC board (Figure 4-25) contains a microprocessor system and a linefeed servo system. The microprocessor system is used to control the ribbon drive clutch and interfaces the linefeed servo to the LOG board. It also provides circuits for the electronic VFC (Vertical Format Control). These circuits employ two 256 x 4 bit RAMs (Random Access Memories) with battery back-up. The servo system uses a linear motor amplifier.

FUSES

F1 - 1½A MDL – Servo Motor Supply

STRAPS

None

*Includes PWB 44C502502-G02 and PROM chip 44A430094

TEST POINTS AND WAVEFORMS

To aid in RFC board troubleshooting, five board edge test points are provided:

TP1– BNSL (Bin Select). Interface signal reserved for future use.

TP2– MCUR (Motor Current). Analog voltage proportional to servo motor current at a ratio of 2.08V/amp.

TP3– $\overline{\text{CLDR}}$ (Clutch Drive). Signal that switches from +24V to 0V whenever the ribbon drive clutch is energized.

TP4– $\overline{\text{AMP DISABLE}}$ (Amplifier Disable). Signal that switches from +1.4V to 0V when the servo amplifier is disabled.

TP5– VCMD (Velocity Command). Analog voltage that commands the servo velocity loop to produce paper motion at a ratio of 3.1 IPS/volt.

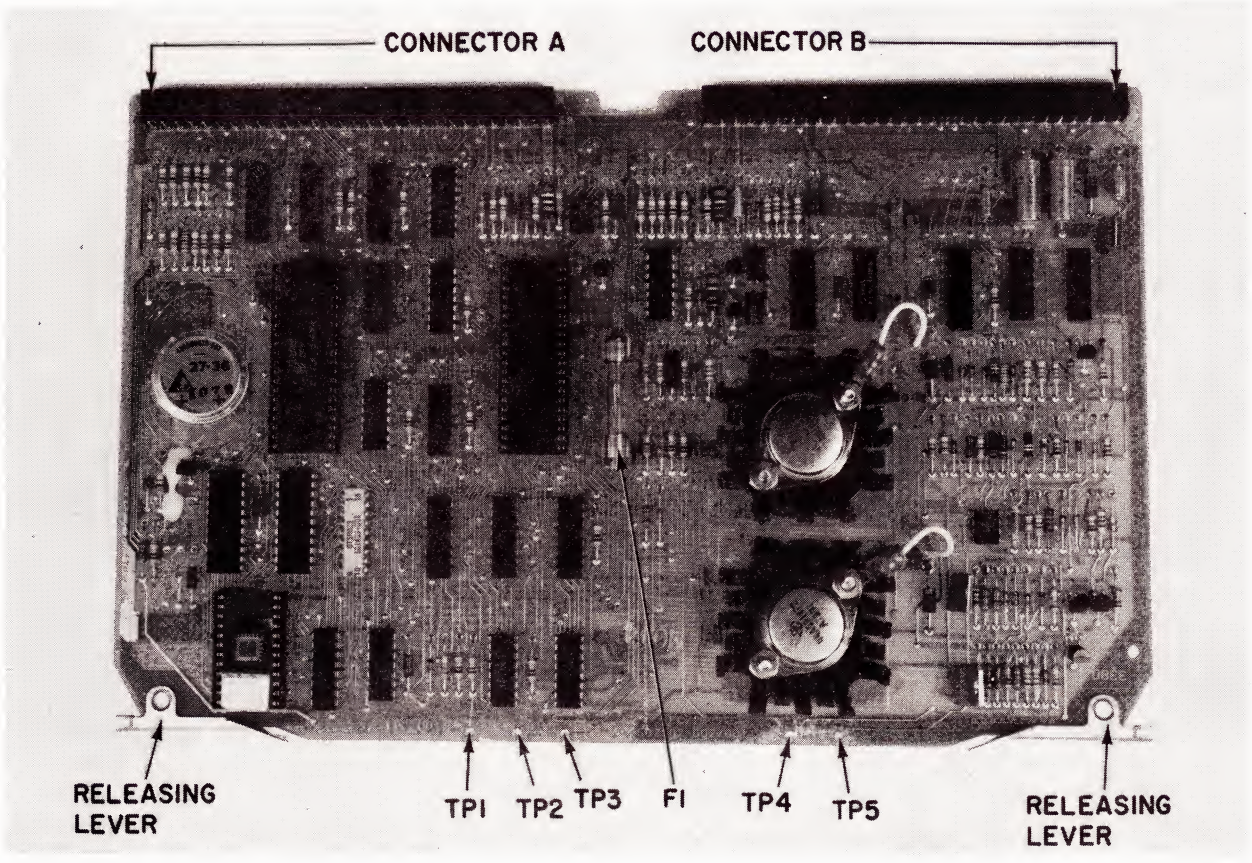


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Figure 4-25. Ribbon and Paper Feed Control Board (RFC)

The following signals and their associated waveforms (Figure 4-26) are available for testing at two of the board's connector pins:

PIN A37 - PHA

PIN A39 - PHB

Figure 4-26. RFC Board Waveforms

NOTE

These signals occur as a result of motor movement. They will be DC when the motor is stationary, and the phase relationship depends on the direction of motor movement.

PRINCIPLES OF OPERATION (FIGURE 4-27)

POWER AND PROTECTION

The RFC board requires +15V, +5V, and -12V to power the logic and low level amplifier stages. The unregulated ±25V is used by the servo amplifier output stages and ribbon clutch drive. The power circuits on the RFC board supply the -5V and +12V for the PROM. The power circuits generate signal CE2 that is clamped to 0V whenever power is removed from the RFC board to ensure that data in the RAMs is not accidentally altered. Also CE2 is pulled to 0V whenever the +15V supply drops below 5.6V or the +5V supply is lost. The power circuits also provide signal ILV (Internal Low Voltage) to initialize the microprocessor. Signal $\overline{\text{AMP DISABLE}}$ is used to disable the servo amplifier preventing paper motion during any low voltage condition.

MICROPROCESSOR SYSTEM

The components of the microprocessor system are the microprocessor, 256 bytes of RAM (Random Access Memory), and 2,000 (2k) bytes of PROM (Programmable Read Only Memory), input ports, and output ports. The microprocessor is powered by a +5V supply and is clocked by the 3.2 MHz oscillator signal, generated on the LOG board. The servo control chip generates a clock signal GPH2. This signal is applied to a flip flop circuit along with the Flag 0 status signal from the microprocessor. The flip flop circuit, in turn, generates a timed interrupt signal every 2.56 ms. The timed interrupt signal is applied to the microprocessor SENSE A input. The microprocessor Flag 0 output is used to reset the flip flop circuit and is controlled by the software interrupt service routine.

MEMORY AND INPUT/OUTPUT (I/O) ADDRESSING

The address bus, comprised of 12 address lines (A0-A11), is used to control memory and I/O addressing. Whenever address line A11 is low and the Read Data Strobe ($\overline{\text{NRDS}}$) is in the active state (low), the PROM is enabled by the PROM Select (PSEL) signal which will also be low. The Address Decode is enabled when address line A11 is high and either one of the signals $\overline{\text{NRDS}}$ or $\overline{\text{NWDS}}$ (Write Data Strobe) is low. When the Address Decode circuit is enabled, it decodes address lines A8, A9, and A10. This decoding process results in a low level appearing on one of the I/O port select lines ($\overline{\text{PT2SEL}}$ - $\overline{\text{PT7SEL}}$), the RAM select line ($\overline{\text{RAMSEL}}$), or the servo control move command ($\overline{\text{PT1SEL}}$). Select lines ($\overline{\text{PT2SEL}}$ - $\overline{\text{PT4SEL}}$) select one of the input ports. Select lines ($\overline{\text{PT5SEL}}$ - $\overline{\text{PT6SEL}}$) select one of the output ports. Select line $\overline{\text{RAMSEL}}$ selects the RAMs. Select line $\overline{\text{PT1SEL}}$ is used as the $\overline{\text{MOVE}}$ command signal for the servo control chip.

RAM BATTERY BACKUP

A battery backup circuit is provided to ensure that the power input (VRAM) to the RAMs never drops below 2V. This will retain the VFU Programming data in the RAMs in the event that the +15V supply is lost, or the Corresponder is turned off.

SYSTEM INPUT/OUTPUT PORTS

Four tri-state buffers serve as the input ports. When a buffer is enabled (by $\overline{PT2SEL}$ - $\overline{PT4SEL}$), data is placed on the data bus. The Ribbon Command Logic ($\overline{RIBC}$) signal must be at a low level whenever the Corresponder is printing.

One of the input ports provides a secondary function. It gates $\overline{FFC}$ (FORM FEED pushbutton signal) and $\overline{VTC}$ (TEST pushbutton signal) into the LOG board whenever the VFU RUN/LOAD switch is in the RUN mode (RUN/$\overline{LOAD}$ is a logic 0). Also, if the optional Sheet Feeder is installed, the Friction Feed switch must be in the pin feed position. In this instance, $\overline{FFX}$ or $\overline{TSTX}$ will go to a 0V level when the FORM FEED or TEST pushbutton respectively is pressed on the front panel. $\overline{TSTX}$ is also applied to a flip flop circuit where it is combined with the flip flop circuit where it is combined with the flip flop output to form the $\overline{RIBC}$ signal. The flip flop is set by a $\overline{XFR}$ (Transfer) pulse whenever an inter ace initiates printing. The flip flop is reset by the Pri nt Complete (PC) pulse when the printer ceases printi g. When the VFU is in the LOAD mode (RUN/$\overline{LOAD}$ is a logic 1), pressing the FORM FEED or TEST pushbutton will have no effect on FFX or TSTX. This allows these pushbuttons to provide alternate functions required when the VFU is in the LOAD mode.

Two Quad D Registers serve as output ports. A positive edge on the clock input of each register latches information on the data bus into the register outputs.

SERVO SYSTEM

The components of the servo system are a logic system (contained in the servo control chip), a digital-to-analog (D/A) converter and motor amplifier, and a motor encoder (mounted on the left side frame of the Corresponder).

Servo Chip and Clock Driver

The microprocessor communicates with the servo control chip on a line-by-line basis. Every time a line feed is desired, a pulse ($\overline{PT1SEL}$) is applied to the servo control chip. This pulse is also the $\overline{MOVE}$ signal. $\overline{MOVE}$ strobes in a data byte that is output on the microprocessor data bus to provide the servo control chip with information on the direction, speed, and size of a paper movement. The servo control chip then controls the linefeed servo motor through the D/A converter and amplifier to produce the desired motion. Whenever the servo control chip is ready to accept a $\overline{MOVE}$ command, $\overline{RTM}$ (Ready To Move) is low. If the servo motor shaft is not at its commanded position, $\overline{REST}$ is high. HVL (High Voltage Low) is pulled up by $\overline{REST}$ through a pull-up circuit to block printing if the servo motor is not at rest. Servo motor position feedback is fed to the servo control chip from the shaft encoder on PHA (Phase A) and PHB (Phase B).

NOTE

PHA and PHB can be checked at board pins A37 and A39 respectively (see "Test Points and Waveforms").

The servo control chip is initialized by the $\overline{SERVO\ RESET}$ signal being at a low level. This same signal is applied through a delay circuit to produce signal $\overline{CSC}$, which is necessary to ensure proper initialization of the chip.

An 800 kHz, 2-phase clock with a +5V to -12V swing is required by the servo control chip. These clock pulses (Ø1 and Ø2) are derived on the RFC board from the 3.2 MHz oscillator provided on the LOG board.

D/A Converter

The servo control chip controls the servo motor through six output signals as follows:

$\overline{ADV\ FB}$	– Advance Feedback
RET FB	– Return Feedback
$\overline{RET\ C}$	– Return Coarse
$\overline{ADV\ C}$	– Advance Coarse
RET V	– Return Vernier
$\overline{ADV\ V}$	– Advance Vernier

RET FB and $\overline{ADV\ FB}$ are constant pulse-width, variable time-ratio signals that cause current flow proportional to servo motor shaft velocity. RET V, $\overline{ADV\ V}$, RET C, and $\overline{ADV\ C}$ are variable pulse-width constant repetition-rate pulses that cause current flow proportional to servo position error. These four signals are used to generate the VCMD (Velocity Command) signal. VCMD represents the square root of the position error.

Motor Amplifier

Velocity feedback current (derived from $\overline{\text{ADV FB}}$ and $\overline{\text{RET FB}}$) and velocity command current (derived from $\overline{\text{ADV V}}$, RET V, $\overline{\text{ADV C}}$ and RET C) are summed together. The resulting current is fed to the servo motor amplifier, that has a gain of 0.2V per microampere. The velocity command current and the velocity error. The output current of the amplifier is limited to 3 amps.

Whenever a low voltage condition occurs in the Corresponder, the signal $\overline{\text{AMP DISABLE}}$ is pulled to 0V. This condition disables the servo motor amplifier output. Also, if the +15V supply should drop below +9V, the amplifier output will be disabled. The amplifier output can also be disabled by the software, through one of the output ports.

Paper Detector Interface

When the optional Sheet Feeder is in use, the RFC board provides the signal PLED which supplies the power to the LED in the paper detector. The paper detector provides feedback signals $\overline{\text{SF}}$ and $\overline{\text{PDET}}$ to the RFC board. Signal $\overline{\text{SF}}$ is low whenever the Sheet Feed mode is selected and $\overline{\text{PDET}}$ is low whenever paper is sensed while the Corresponder is in the Sheet Feed mode.

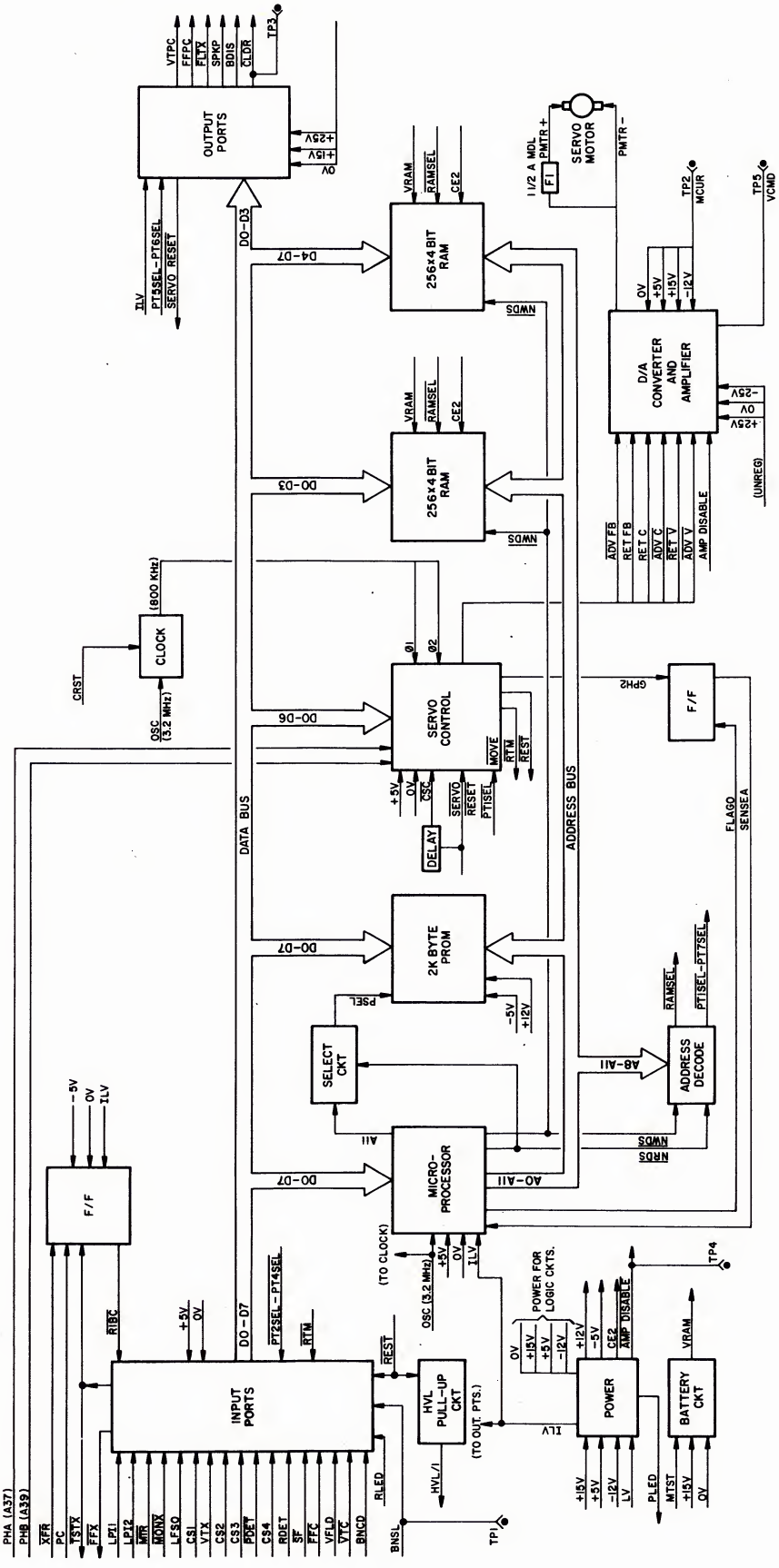

Figure 4-27. RFC Board Functional Block Diagram

VERTICAL CONTROL PANEL (VCP) 44B418292

The VCP board (Figure 4-28) is the small control panel board for the electronic Vertical Format Unit (VFU). The VFU is mounted near the top of the printer's right side frame. The VCP board contains a 4/6/8 lines/inch selector switch, a VFU RUN/LOAD selector switch, a VFU channel selector and three pull-up resistors.

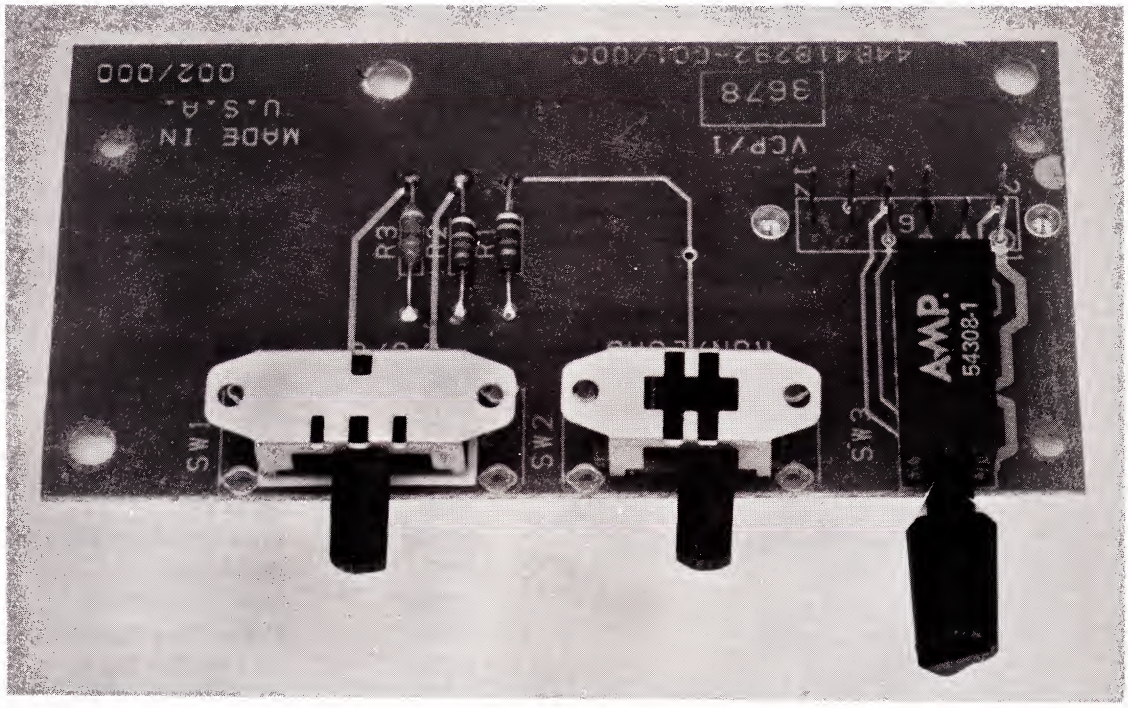

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Figure 4-28. Vertical Control Panel Board (VCP)

SECTION 4

GLOSSARY

The following glossary contains a list of most of the commonly used signal names and their definitions used in the TermiNet 510 Corresponder.

ACK	Acknowledge
ALML	Complement of Alarm Light
ALRM	Complement of Alarm
ANS	Answerback
BELS	Complement of Bell Signal
BNCD	Bin Code. For future use. Works in conjunction with BNSL.
BNSL	Bin Select. For future use. Works in conjunction with BNCD.
CBAR	Crowbar
CLDR	Ribbon Clutch
CS1, CS2, CS3, CS4	VFU Channel Switch
D1-D8	Data Lines 1 through 8
DB1-DB7	Complement of Data Bits 1 through 7
DSTB	Data Strobe
ECT	Even Commutate
EDR	Even Drive
EF	Even Finger
EHD	Even Hammer Drive
ELED	Even LED
EVNF	Even Finger
FCNT	Full Count
FCOM	Phototransistor Common
FEED	Paper Feed Signal
FEH	Fire Even Hammers
FFC	Form Feed P. B. Switch
FFPC	Formfeed Photocell
FFX	Formfeed Signal to LOG Board
FLTX	Fault Signal
FOH	Fire Odd Hammers
FRAME	Frame Ground
GND	Ground (Chassis)
HISX	Complement of Here Is Signal
HVL	High Voltage Low
HZ	Column Decoding Z Line
H0	Column Decoding 0 Line
H2	Column Decoding 2 Line
H4	Column Decoding 4 Line
H6	Column Decoding 6 Line
H8	Column Decoding 8 Line
H10	Column Decoding 10 Line
H12	Column Decoding 12 Line
H14	Column Decoding 14 Line
H16	Column Decoding 16 Line
H32	Column Decoding 32 Line
H48	Column Decoding 48 Line
H64	Column Decoding 64 Line
H80	Column Decoding 80 Line
H96	Column Decoding 96 Line
H112	Column Decoding 112 Line
H128	Column Decoding 128 Line
INT	Interrupt
INTX	Complement of Interrupt P. B.
LEDC	LED Common
LFSO	Linefeed Servo
LFX	Complement of Linefeed P. B.
LOPX	Low Paper Switch Signal
LPFP	Low Paper From Printer
LPI1, LPI2	Lines Per Inch Switch
LTP	Ready Lamp
LV	Low Voltage
LVS	Low Voltage Signal for HVS
M+F	Motor or Paper Feed
MOF	Motor Off
MOFX	Complement of Motor Off P. B.
MON	Motor On
MONX	Complement of Motor On P. B.
MTR	Motor Signal
MTRL	Motor Light Signal
MTRR	Motor Relay Signal
MTST	Memory Test Signal
NRDS	Read Data Strobe
NWDS	Write Data Strobe
OCT	Odd Commutate
ODDF	Odd Photocell
ODR	Odd Drive
OF	Odd Finger
OHD	Odd Hammer Drive
OLED	Odd LED
OSC	Oscillator Output
PC	Print Complete

PDET	Paper Detector. Low when paper is present
PER	Parity Error
PLED	Power Souce for Paper Detector LED
PMTR+, PMTR-	Paper Feed Servo Motor Control Lines
PON	Power On
RDET	Ribbon Detector
RFP	Ready From Printer
RLED	Film Ribbon Carriage LED
RLT	Ready Light
RTM	Ready to Move
RTP	Ready to Printer
SF	Sheet Feed. Low when Corresponder in sheet feed mode.
SOL1-SOL132	Solenoid Coil Connection for Print Positions 1 through 132
SPKP	Sprocket Pulse
SPR1 - SPR4	Spare #1 through Spare #4
SSTB	Slew Strobe
STB	Strobe
TRAN	Transfer
TSTX	Test Signal to LOG Board
VCMD	Velocity Command Analog Voltage
VTPC	Vertical Tab Photocell
VTX	Complement of Vertical Tab P. B.
XFR	Complement of Transfer Signal
Z	Zener Diode Paralleling Connection
0V	Signal Ground

CHAPTER 5
MAINTENANCE
SECTION 1
PREVENTIVE

GENERAL

Preventive maintenance consists mainly of visual inspection, cleaning, and lubrication. If a problem is discovered and the cause is not obvious, refer to the Troubleshooting section of this chapter. If the cause of the problem has been determined, refer to Parts Removal and Adjustment section of this chapter to install a new component or to make an adjustment.

It is suggested that the instructions in this section be performed every six months or 1000 motor-on hours whichever occurs first (unless otherwise noted). It may be necessary for the serviceman to modify Preventive Maintenance instructions to suit extreme variations of use and environment of the Corresponder.

VISUAL INSPECTION

Raise the cover and check the Corresponder as follows:

1. Inspect belts, pulleys and gears for wear. An accumulation of dust under the pulleys is an indication of excessive wear of a pulley or a drive belt.

2. Check for loose or missing parts.

3. Check for bent or broken print fingers.

4. Check for frayed, folded, or broken ribbon.

5. While holding the motor pulley stationary, move the print belt back and forth and check for excessive play (movement of the print belt more than one finger width) in the system. Too much play indicates a loose pulley or drive belt.

6. Rotate print belt and check for freedom of movement.

7. Check for loose connections and frayed wiring.

ADJUSTMENT CHECKS

Check all adjustments in Table 5-1. If adjustment is needed, refer to Section 3 of this chapter for procedure.

OPERATION CHECKS

Perform the checkout procedure in Chapter 2.

CLEANING AND LUBRICATION

CLEANING

One of the most important areas to keep clean on the Corresponder is the area around the photocell. A build-up of paper dust around this area can impair the effectiveness of the photocell causing erroneous printing. The most efficient method for cleaning the photocell is to remove the ribbon cartridge and blow away the paper dust on top of the photocell block on both sides of the print belt. A small squeeze ball type air blower, which is commonly used for cleaning camera lenses, is recommended for cleaning the photocell. Photocell cleaning must be performed during each routine preventive maintenance.

If necessary, the platen should be cleaned with alcohol to remove ink accumulations.

CAUTION

Do not apply alcohol or any other cleaning agent to an Oilite* bearing.

Accumulations of dirt inside the Corresponder can be removed with a cloth dampened in alcohol or blown out with dry compressed air (if available).

Type fingers can be cleaned by using a type cleaning brush backed by a sponge or soft cloth, as shown in Figure 5-1.

Keep the inside of the print belt clean by wiping with a dry cloth or blowing with dry compressed air (if available). Care should be exercised not to damage or deposit dirt on the rebound belt.

*Registered trademark of Chrysler Corp./Amplex Div.

TABLE 5-1
ADJUSTMENTS

PART	ADJUSTMENT LOCATION	SPECIFICATION	PAGE LOCATION OF PROCEDURE
Idler Pulley Drive Belts	Deflection of belt with 4 oz. (114 g) of applied pressure applied to mid-span of belt.	0.130-0.190 in. (3.3-4.8 mm) Motor 0.130-0.190 in. (3.3-4.8 mm) Hammerbank	5-48
Linefeed Servo Motor Belt	Deflection of belt with 4 oz. (114 g) of applied pressure applied to mid-span of belt at the tightest point.	.065-.105 in. (1.65-2.67 mm)	5-47
Rear Magnetic Print Belt Guide	Between crowned outside edge of print belt pulleys and rear surface of belt guide. (Right pulley in normal running position.) Height adjustable with 0.005" shims.	0.039 ± 0.003 in. (1.0 ± 0.08 mm)	5-56
Front Print Belt Guide	Between guide and print belt.	0.050-0.070 in. (1.3-1.8 mm)	5-58
Photoelectric Assembly	Initial setting. Position of elongated hole in photo-electric housing with respect to the vertical mounting screw.	Centered	5-66

761-10-0803

Figure 5-1. Cleaning Type Fingers

LUBRICATION

1. When cleaning parts before lubrication, do not use alcohol or any other cleaning agent on OILITE bearings.

2. For average environmental conditions, the lubrication instructions in Table 5-2 should be performed every six months or 1000 motor-on hours whichever occurs first unless noted otherwise. If the environment is extremely dirty, the lubrication instructions should be followed more often as circumstances warrant.

NOTE

The two recommended lubricants are:

Oil SAE 10W-20W-40 non detergent motor oil (Shell X100 or equivalent non-detergent type).

Grease Lubriplate* #630-AAME-D6A3

BUTTON-UP

The preventive maintenance procedure should be completed by performing the following:

INSPECTION

1. Wires must not touch any moving parts.

2. Check for blown fuses on the XPS board and secure power supply cover.

3. All subassembly hardware must be secure, especially the following:

   a. Hammer and Print Belt Assembly

   b. Motor

   c. Pulleys

   d. Platen

   e. Interlock Switch

   f. Rebound Bar

   g. Belt Guides

   h. Photoelectric Sensor

   i. Forms Tractor Assembly

4. Make sure there is no loose hardware or other foreign matter inside the Corresponder, and that all retaining rings are in place on pulleys, shafts, etc.

5. Check platen movement to make sure it turns freely.

6. Check that the forms tractors rotate easily when the platen knob is rotated in either the clockwise or counterclockwise direction.

7. Make sure the paper handling system is adjusted so the paper feeds freely and does not skew. (See Chapter 3 – Operation for paper handling procedures.)

8. Check to see that the print belt rotates freely in the counterclockwise direction when moved by hand.

EXTERNAL CLEANING

Clean the top and bottom covers, pedestal, and control panel with a cloth dampened with a non-abrasive household cleaning detergent. Wipe all cleaned areas with a cloth dampened with water. Use only water and a soft, lint-free rag for cleaning the paper shield.

TOOLS AND TEST EQUIPMENT

The test equipment recommended for checking outputs on PWB test points is a dual trace oscilloscope. Scope syncing should be done internally from observed test points.

*Registered trademark of Fiske Brothers Refining Company

TABLE 5-2
LUBRICATION

LUBRICATION POINT	METHOD
Idler Pulley (Figure 5-2)	- Idler Pulley contains Oilite Bearings—apply two drops of oil on shaft adjacent to bearing.
Platen Bushings (Figure 5-2)	- Apply two drops of oil to shaft at end of bushing on each end of platen.
Platen Drive Gears (Figure 5-2)	- Remove platen. - Remove any dried grease and dirt from gears. - Lightly coat gear teeth with grease. - Reinstall platen.
Ribbon Drive Mechanism (Figure 5-2)	- Remove ribbon cartridge. - Clean any dirt or dried grease from gears with a small brush or swab. - Rotate print belt so all areas of gears can be cleaned. - Apply two drops of oil on drive shaft just above gear clutch assembly (Figure 5-43). - Lightly coat all gear teeth with grease. - Reinstall ribbon cartridge.
Print Belt (Figure 5-2)	- Remove print belt. - Thoroughly clean belt with a dry cloth or dry fiber brush. Use no chemicals. - Coat belt surface with graphite (anti-static) solution (Part Number 44A410695-G01) using small, bristle paint brush. Also coat the cracks between the fingers and belt. - Reinstall print belt. - Turn Corresponder motor on. - With print belt running, spray the inside of belt with lubricant near right print belt pulley directed at guide rib for 1-2 seconds. Use MS122 Aerosol Dry Lubricant (Part Number 44A417371-001).

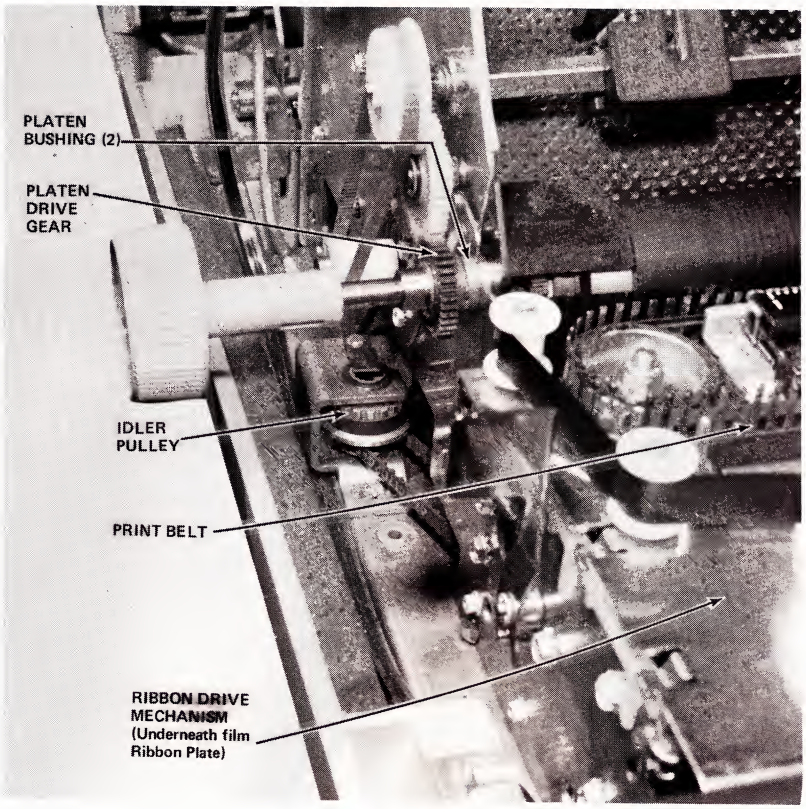

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Figure 5-2. Corresponder Lubrication Points

Special tools helpful in servicing the TermiNet 510 Corresponder are listed in Table 5-3. A listing of suggested standard tools for servicing the Corresponder appears in Table 5-4.

TABLE 5-3
SPECIAL TOOLS AND LUBRICANTS

PART NUMBER	ITEM	PURPOSE
44A410619-G01	Timing Gauge	To set correct timing of hammer fire for correct print out.
44A410583-001	Pulley Height Gauge	Setting correct vertical height of shimmed print belt pulleys (to match belt guides).
44B412269-001	Finger Removal Pliers	For extracting and replacing print belt print fingers without damaging type head.
44A417371-001	Lubricant	Lubricating the print belt.
44A410695-G01	Graphite Solution	Replacing worn graphite coating on print belt.
– – – –	Shell X-100 SAE 10w-20w-40 Motor Oil	Lubricating Corresponder locations in Table 5-2.
– – – –	Lubriplate #630-AAME-D6A3 Grease	Lubricating Corresponder locations in Table 5-2.
– – – –	Moly Dag 200 Lubricant	Lubricating upper clevis pins.

TABLE 5-4
SUGGESTED STANDARD TOOLS

(1/8 in. x 8 in.) Flat Blade Screwdriver	(Xcelite R188)
(5/32 in. x 4 in.) Flat Blade Screwdriver	(Xcelite R5324)
*(3/16 in. x 8 in.) Flat Blade Screwdriver	(Xcelite R3164)
(¼ in. x 6 in.) Flat Blade Screwdriver	(Xcelite R146)
(5/16 in. x 8 in.) Flat Blade Screwdriver	(Xcelite R5168)
*Stubby Flat Blade (¼ in. x 1 in.) Screwdriver	(Xcelite S141)
*Flat Blade Offset Screwdriver (#6, #10)	(VACO VO-2)
*Screw Launcher (3/16 in. x 6 in.)	(VACO K-36)
*6 in. Adjustable Wrench (¾ in. Jaws)	(Diamalloy D76)
*¼ in. Regular Nut Driver	(Xcelite HS8)
7/16 in. Regular Nut Driver	(Xcelite HS14)
Extra Long Magnetic Nut Driver (¼ in. x 10 in.)	(Xcelite A8M)
5/16 in. Combination Wrench	
.050 in. Across Flat Hex Key	
1/16 in. Across Flat Hex Key	
5/64 in. Across Flat Hex Key	
9/64 in. Across Flat Hex Key	
5/32 in. Across Flat Hex Key	
*Drift Pin (1/16 in. Dia.)	
*Needle Nose Pliers	(Xcelite 56CG)
Diagonal Pliers	(Xcelite 55CG)
Long Nose Pliers	(Xcelite 41CG)
Knife	(X-ACTO #2)
*Replacement Knife Blades	(X-ACTO #25)
Feeler Gauges (0.0015 in. to 0.025 in.)	(K-D Tools, Lancaster, Pa. K-D No. 161)
*8 oz. Belt Tension Gauge	(Teletype #110443)
15 Watt Soldering Iron	(Ungar Princess #6903)
*15 Watt Soldering Element	(Ungar #6915)
*Soldering Tip	(Ungar #6961)
*Soldering Aid	(Hunter #51)
Desoldering Tool	(Soldapullt D5017)
60/40 Resin Core Solder	
*Heat Sink	(Hunter No. 51G)
*Tip Cleaning Sponge and Stand for Holding Iron	
Wire Strippers (#30 AWG – #12 AWG)	
Utility Push-Pull Gauge	(Chatillon Catalog No. LP15. John Chatillon & Sons, 83-30 Kew Gardens Road, Kew Gardens, New York 11415)

*Optional

SECTION 2

TROUBLESHOOTING

ELECTRICAL

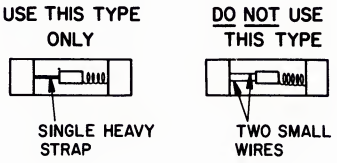
FUSES

Table 5-5 lists fuses used in the TermiNet 510 Corresponder along with their part numbers, locations, and circuits they protect.

TABLE 5-5
FUSES

FUSE	LOCATION	PART NUMBER	CIRCUIT
4A MDA	XPS (F1)	44A418092-002	+15V
5A MDX	XPS (F2)	K9774741-P15	+10V
3A MDX	XPS (F3)	K9774741-P14	+25V
3A MDX	XPS (F4)	K9774741-P14	-25V
**7A MDX	XPS (F5)	K9774741-P26	117V
1/8A PICO	LOG (F1)	44A417087-001	PHASE 1 CLOCK
1/8A PICO	LOG (F2)	44A417087-001	PHASE 2 CLOCK
1.5 MDL	RFC (F1)	K9774741-P20	MOTOR POWER

**Replacement fuses must be of the single strap type (illustrated below).



STRAPPING OPTIONS

Several straps are available to change options on the TermiNet 510 Corresponder. These wire straps are not soldered, but simply plug into cups located on the associated printed wire boards (PWB's). The functions of the wire straps are given in Table 5-6.

TABLE 5-6
PRINTED WIRE BOARD (PWB) WIRE STRAPS

PWB NAME	STRAP POSITION		FUNCTION
	IN	OUT	
INT/2	J1	J2	Corresponder checks for even parity.
	J2	J1	Corresponder checks for odd parity.
		*J1, J2	No parity check.
	J3	J4	Status indication for paper feeding (M+F Signal is high).
	*J4	J3	Status indication for motor (M+F Signal is high).
	J5	J6	Form Feed, Vertical Tab, and Vertical Slew commands are ignored.
	*J6	J5	Corresponder responds to Vertical Format Codes.
	J7	J8	For positive-going input Data Strobe.
	*J8	J7	For negative-going Input Data Strobe.
	J9	J10	READY is high when Corresponder is unable to receive data.
	*J10	J9	READY is low when Corresponder is unable to receive data.
	*J11	J12	Corresponder ignores Delete Code.
	J12	J11	Corresponder ignores Delete and Underline Codes (used with three font belt option using 64 character subsets).
	J13		No character will print when a Parity Error is detected.
		*J13	V will print when a Parity Error is detected.
	J14	J15, J16	Print action will reset PER signal. Corresponder will ignore Parity Errors in VFU Codes.
	*J16	J14, J15	Print action will reset PER signal. Parity Errors in VFU Codes will set PER signal.
	J15	J14, J16	PER Signal (once set) is reset by next character received without a Parity Error.
HAMB	*J3, *J4	*J1, *J2, *J5	Standard motherboard for 510 Corresponder.
HVS/5	*J2	*J1, *J3	Standard Strapping – DO NOT CHANGE.
LOG/8		J2, *J3	Standard Strapping – DO NOT CHANGE.
	J4 to 80		80 Print Column operation.
	J4 to 120		120 Print Column operation.
	*J4 to 132		132 Print Column operation.

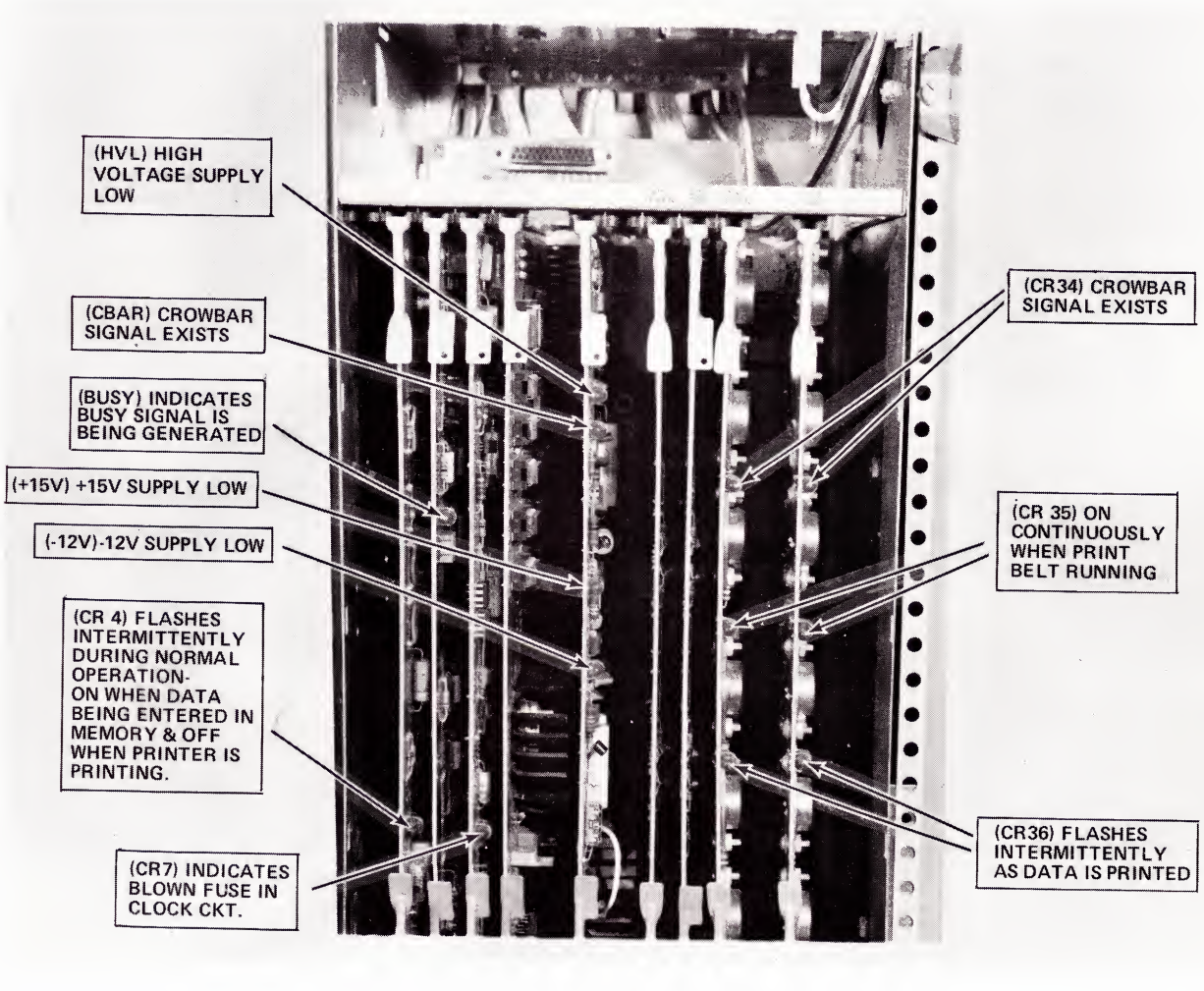
*Standard strapping configuration

SELF TEST

Troubleshooting (electrical) the TermiNet 510 Corresponder should begin by utilizing the built-in self test features. The self test provides for a rapid checkout of Print action. The staggered test pattern will print continuously as long as the TEST push-button on the control panel is held in. If results cannot be obtained from the self test, refer to the following description of the PWB status indicators and the troubleshooting guide at the end of this section.

STATUS INDICATORS (Figure 5-3)

To facilitate troubleshooting, the Corresponder contains light emitting diode (LED) status indicators located on the outside edges of four different printed wire boards. The status indicators can be readily viewed from the front of the pedestal when the pedestal cover and board retainer is removed. Figure 5-3 shows the locations of the indicators along with an explanation of which conditions exist when they are illuminated.



797-27-1210

Figure 5-3. Status Indicators

Table 5-7 should provide some assistance in quickly identifying a defective PWB or other problem by examining the condition of the PWB Status Indicators and/or ALARM indicator. No attempt has been made, however, to cover every possible fault condition that could occur. Those items listed under POSSIBLE CAUSE in Table 5-7 are given as suggestions only for a starting point in troubleshooting the Corresponder. If the fault can not be readily identified by using the LED indicators, consult the Troubleshooting Guide at the end of this section for additional suggested problem areas.

TABLE 5-7
TROUBLESHOOTING WITH THE LED INDICATORS

CONDITION	LED INDICATORS ALARM CR34/HVS CR35/HVS CR36/HVS HVL/PSR CBAR/PSR +15V/PSR −15V/PSR +5V/PSR −12V/PSR CR7/LOG	POSSIBLE CAUSE
1.	O O ● ◐ O O O O O O O O Corresponder Running and Printing Normally. READY Indicator On.	No Fault — All Conditions Normal. **WARNING** REMOVE AC POWER FROM CORRESPONDER BEFORE REMOVING ANY PRINTED WIRE BOARDS.
2.	● ● O O O ● O O O O O Motor Off.	LHD* Board. HVS* Board. HINT When condition 2 occurs, remove LHD board from same position (odd or even) where CR34 on HVS is lit. With LHD removed, turn Corresponder on. If motor continues to run, CR34 goes out, and CR35 comes on, the removed LHD board is probably faulty. However, if CR34 lights, the HVS board containing the lighted CR34 is probably faulty. PSR Board. Print Belt Photodetector. LOG Board. Shorted Hammerbank Coil.
3.	O ● O O O ● O O O O O Motor Runs — No Printing In ODD or EVEN Positions.	HVS* LHD* HINT When condition 3 occurs, interchange the two HVS boards. If print omission has changed from even to odd (or vice versa), replace HVS board for columns not printing (even or odd). If print omission does not change, replace the LHD board for columns not printing.

*EVEN or ODD position LHD or HVS faulty depending upon which HVS has CR34 lit.

TABLE 5-7
TROUBLESHOOTING WITH THE LED INDICATORS
(Continued)

CONDITION	LED INDICATORS ALARM CR34/HVS CR35/HVS CR36/HVS HVL/PSR CBAR/PSR +15V/PSR -15V/PSR +5V/PSR -12V/PSR CR7/LOG	POSSIBLE CAUSE
4.	● O O O O O O O O O O Motor Off.	Out of Paper. Top Cover not closed tight. Low Belt Speed caused by Mechanical Binding. LOG Board. Print Belt Photodetector.
5.	O O ● O O O O O O O ● Motor Runs – No Printing.	Fuse F1/F2 Blown on LOG Board. LOG Board.
6.	● ● O O O ● O O O O O (any one) Motor Off.	XPS Board (Low Voltage Supply Low). LOG Board. LMB Board.
7.	O ● ● O ● ● O O O O O Motor Runs – No Printing	PSR Board (High Voltage Supply Low). XPS Board. Blown Fuse (F1). Shorted Capacitor (Top of Bustle).
8.	● O O O O ● O O O O O Motor Off.	PSR Board.
9.	● ● O O O ● ● O O O O Motor Off.	PSR Board. XPS Board. Blown Fuse (F3).
10.	● ● O O O ● O ● O ● O Motor Off.	PSR Board. XPS Board. Blown Fuse (F4).
11.	● ● O O O ● O O ● O O Motor Off – Power OFF Indicator Out.	PSR Board. XPS Board. 15000 µf. Capacitor (C11) opens up or Wire Leads Disconnected. Blown Fuse (F2).
12.	O O O O O O O O O O O Motor Off – All Indicators Off – Fans Running.	Blown Fuse (F5). Interlock Switch.

TABLE 5-7
TROUBLESHOOTING WITH THE LED INDICATORS
(Continued)

CONDITION	LED INDICATORS ALARM CR34/HVS CR35/HVS CR36/HVS HVL/PSR CBAR/PSR +15V/PSR -15V/PSR +5V/PSR -12V/PSR CR7/LOG	POSSIBLE CAUSE
13.	O O O O O O O O O O O Motor Off – All Indicators Off – Fans Off.	Fuse Blown on Auto Transformer (International Models) in Pedestal.
14.	O O ● ◐ O O O O O O O Corresponder Running – No READY Indicator	Bad Connection to Data Source. Interface Board.
	LEGEND O LED not illuminated. ● LED illuminated. ◐ LED flashes on and off.	

TROUBLESHOOTING GUIDE

If a preliminary examination of the status indicators does not immediately reveal the cause of a problem, the following guide should be used as a further aid in troubleshooting the Corresponder.

Before using the Troubleshooting Guide, determine what the problem is and determine what functions are operating correctly. Find the problem description in the center of the guide that best describes your problem. Under the problem description, find the condition in the left hand column of the guide that best describes the conditions related with your problem. In the right hand column, across from the appropriate condition, you will find a possible cause to your problem.

TROUBLESHOOTING GUIDE

CONDITIONS	POSSIBLE CAUSE
CORRESPONDER WILL NOT TURN ON	
No Lamps, Motor, etc.	1. Corresponder not plugged into outlet. 2. Primary fuse missing or blown. 3. XPS Board.
Lamps, But No Motor Alarm Light ON	1. Paper-Out Switch. 2. Paper Load Switch. 3. Low voltage (AC Input). 4. INT Board. 5. LOG Board.
Lamps, But No Motor Alarm Light Off	1. XPS Board. 2. Pushbutton switch. 3. Starting capacitor – shorted or leads off. 4. Defective motor. 5. Print fingers caught. 6. Hammer caught in fingers.
MOTOR STARTS BUT WILL NOT KEEP RUNNING	
	Electrical
2 - 3 Seconds Only	1. PSR Board. 2. Primary fuse blown. 3. Loose or broken wire to photocell. 4. HVS Board. 5. Mother Board.
	Mechanical
	1. Drive belt tight. 2. Print finger missing. 3. Print finger bent or catching. 4. Misalignment of pulleys and belt guide. 5. Drive belt off. 6. Print finger not seated in belt. 7. Dust in photocell. 8. Motor pulley loose.
Runs Minutes to Hours	Electrical Static Noise
	1. Open ground lead. 2. Loose or intermittent connection.
	Electrical
	1. PSR Board. 2. Mother Board. 3. XPS Board.

(Continued)

CONDITIONS	POSSIBLE CAUSE
MOTOR STARTS BUT WILL NOT KEEP RUNNING (Continued)	
	Mechanical
	1. Print belt dirty. 2. Drive belt tight. 3. Idler pulley binding. 4. Misalignment between pulleys and belt guide. 5. Cooling fan.
MOTOR RUNS BUT NO PRINTING OR BAD PRINTING	
No Printing in Some Columns	1. Broken common wire on coil bank. 2. LOG Board (missing FOH or FEH). 3. LHD Board. 4. Broken wire on coil bank (missing one column).
A Specific Character Does Not Print or is Smudged	1. Bent print finger. 2. Top part of print finger missing.
Prints but Snags Fingers	
• On Particular Character Only	Bent print finger.
• On Particular Column Only	1. Bent clevis. 2. Plunger binding in coil bank. 3. Hammer throw adjustment.
• On Odd or Even Columns	1. LHD Board. 2. HVS Board.
• At Any Column or Character	1. Bent print finger. 2. Photocell Timing. 3. LHD Board. 4. HVS Board. 5. Dust in Photocell.
Gapping (not associated with a particular column/s)	1. Photocell Defective. 2. PSR Board.
Gapping (associated with a particular column/s)	Worn Clevis and Plunger Assembly.
PRINTS LIGHT ON ONE PART OF CHARACTER	
Light On Top Or Bottom All Columns	1. Hammer bank not seated properly. 2. Magnetic belt guide incorrect height.
Light On Top One Character Only	Finger not seated in belt.
Light On Left	1. Hammer throw adjustment. 2. Bent clevis. 3. Plunger binding in coil bank. 4. PSR Board.

(Continued)

CONDITIONS	POSSIBLE CAUSE
PRINTS LIGHT ON ONE PART OF CHARACTER (Continued)	
Light On Right	1. Bent print finger. 2. Photocell Timing. 3. PSR Board.
PRINTS LIGHT ON ALL CHARACTERS	
Ribbon Does Not Move	1. Ribbon cartridge defective. 2. Ribbon expended — needs replacement. 3. RFC Board. 4. Ribbon Drive Clutch.
Ribbon Does Move (Fabric Ribbon Only)	Ribbon worn — cartridge needs replacement.
PRINTS DESIRED COLUMN PLUS ADDITIONAL COLUMNS	
	1. LOG Board. 2. LHD Board.
LINE FEED PROBLEMS	
Uneven Line Feeds	1. Obstruction holding paper. 2. Friction brake. 3. Line gear assembly.
	Electrical
Double Line Feed When Single Called For	1. LOG Board. 2. RFC Board.
	Electrical
Single Line Feed When Double Called For	1. LOG Board. 2. RFC Board.
Continuous Line Feeds When Power is Applied	Line feed servo
	Electrical
No Line Feed	1. RFC Board. 2. LOG Board. 3. Mother Board.
Multiple Line Feeds or Form Feeds When Applicable Pushbutton Is Pushed Once	1. Pushbutton Switch. 2. LOG Board. 3. RFC Board.

(Continued)

CONDITIONS	POSSIBLE CAUSE
PAPER HANDLING	
Will Not Feed Correctly	See line feed section.
Tracks To One Side	1. Obstruction holding paper. 2. Adjustment of Forms Tractors. 3. Platen not locked at ends.
False Low-Paper Indication	When used in front paper loading configuration, the front low-paper sensor plug must be plugged into jack under the left front corner of Corresponder (see Figure 5-12). When used in the rear paper loading configuration, the front low-paper sensor plug must be removed from jack under the left front corner of Corresponder (see Figure 5-12).
ON-LINE OPERATION	
Hammer Fires Repeatedly In Column 1	Font tab missing.
Hammer Fires Each Time Finger Passes Photocell	1. LHD Board (shorted SCR). 2. LHD Board (short on printed wiring board runs).
Random Hammer Misfire	1. XPS arc suppression defective. 2. Insufficient grounding. 3. LHD Board.
Primary Fuse Blows When Power Applied	1. XPS Board shorted. 2. Wiring shorted from XPS. 3. HVS Board. 4. LHD Board. 5. PSR Board. 6. RFC Board. 7. Transformer.
Blows Primary Fuse at Particular Hammer Position	Shorted coil.
ALARM Indicator Lights	LOG Board.
Power On — ALARM Indicator Lights	LOG Board.
Motor Runs When Power Is Applied	1. INT Board. 2. XPS Board.
Constant READY Light	INT Board.
Garbled Printing	1. Dust in Photocell. 2. INT Board. 3. LOG Board.

LHD BOARD – HAMMER COIL CONNECTIONS

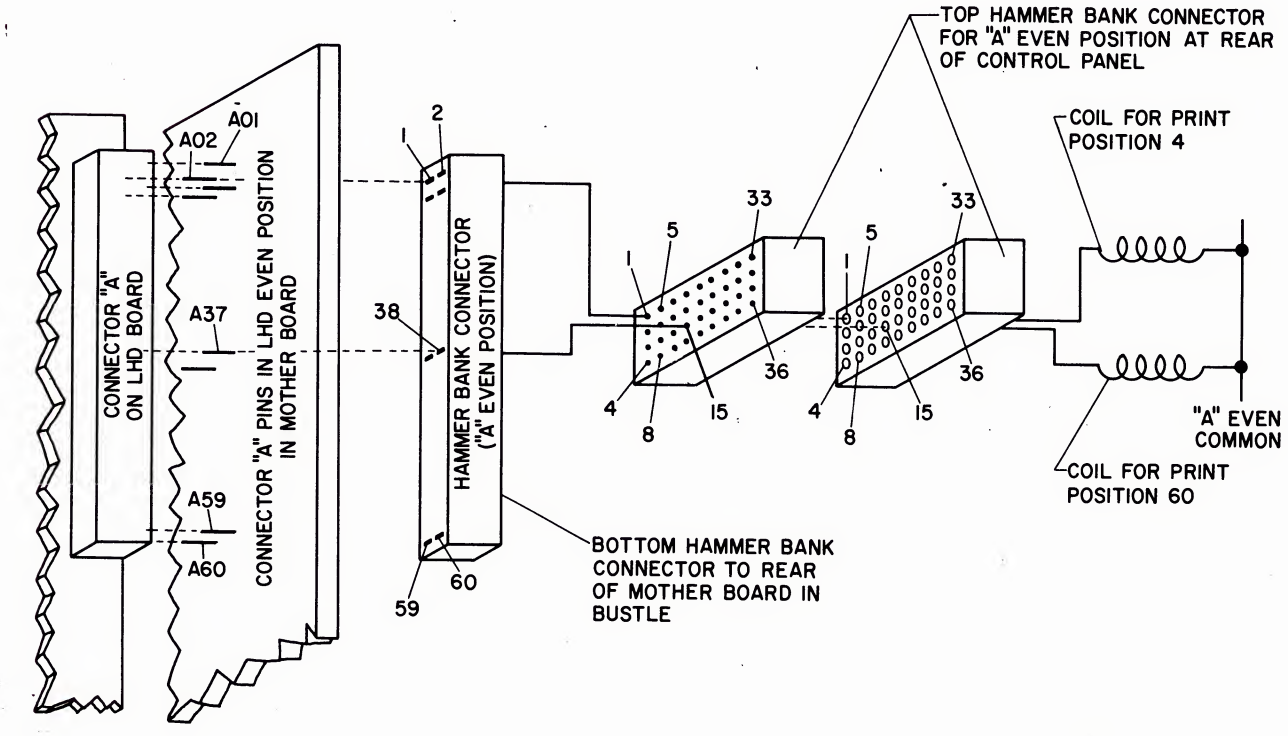
Troubleshooting the Corresponder for one or more columns not printing can be facilitated by understanding how connection is made between the Line Hammer Decoder (LHD) boards and the hammer bank coils.

Two identical LHD boards are used in the bustle of the Corresponder – one for the odd slot for controlling the odd hammer coils and one in the even slot for controlling the even hammer coils.

NOTE

A pair of slots is provided in the bustle for the two LHD printed wire boards. The slot to the right in this pair is the odd slot while the left slot is the even one.

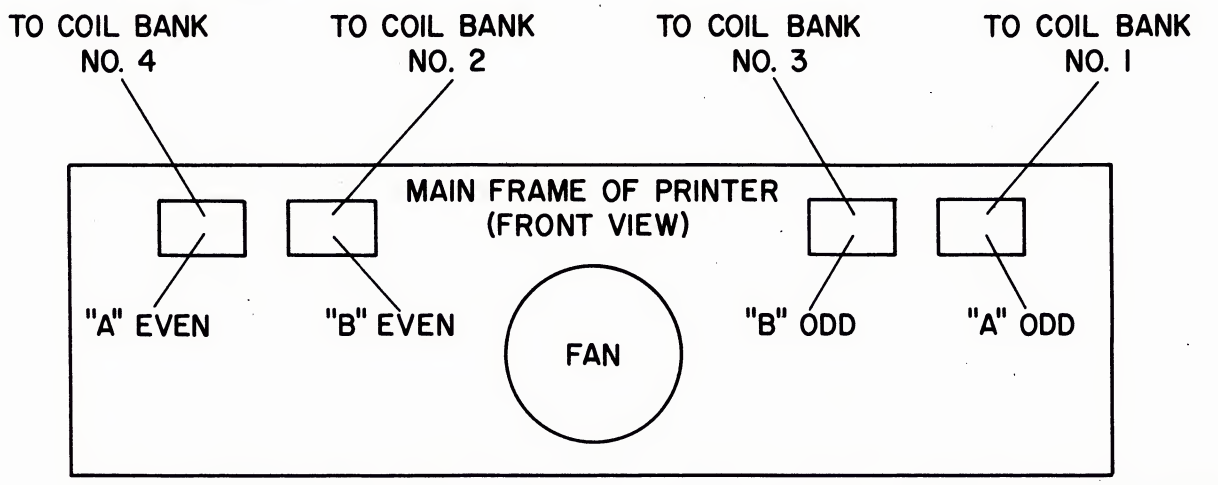
Each LHD board has two connectors – an A connector at the top, and a B connector at the bottom. These two connectors mate with the two groups of 60 pins each on the Mother Board – an A group and a B group. The Mother Board pins extend through the Mother Board making them also available on the rear side (facing rear of pedestal) of the Mother Board where the bottom hammer bank connectors are attached. The hammer bank coil wires run up through the bottom of the Corresponder to the top hammer bank connectors located in the front frame of the Corresponder at the rear of the control panel. Figure 5-4 illustrates typical connections for print positions 4 and 60. The connector numbering scheme is also illustrated in Figure 5-4.



PLH-7015

Figure 5-4. LHD Board to Hammer Coil Connections

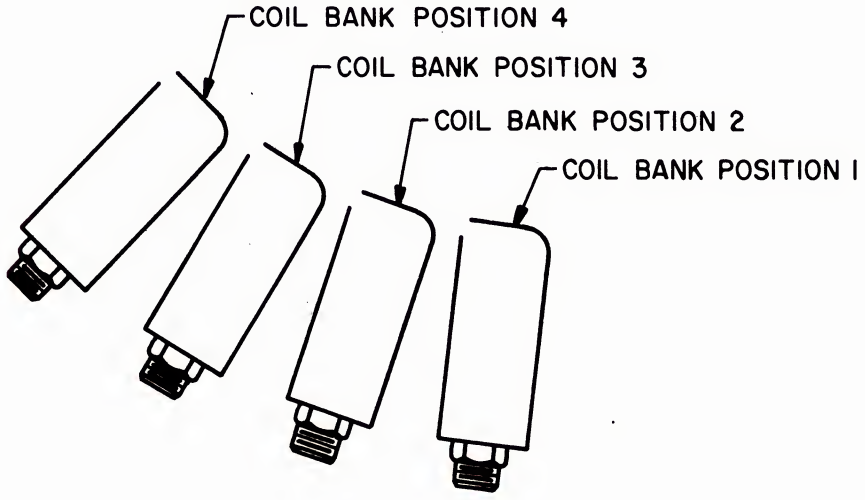
The relative positions of the top hammer bank connectors are illustrated below in Figure 5-5. An identifying label is affixed on the bottom of each top hammer bank connector.



PLH-7016

Figure 5-5. Location of Top Hammer Bank Connectors

Figure 5-6 illustrates the relative positions of the coil bank assemblies in the hammer bank. Each of the four coil banks contains 33 coils to make up a total of 132 coils — one for each print position.



PLH-7017

Figure 5-6. Relative Positions of Coil Bank Assemblies As Viewed from Right End

The following table (Table 5-8) can be used as a handy troubleshooting tool when checking for open or shorted hammer bank coils. Column one in the table corresponds to print positions (or columns) on the Corresponder. Column two gives the terminal number in the top hammer bank connector corresponding to the print position in column one. Column three gives the terminal numbers in the bottom hammer bank connector (connector on rear of Mother Board) corresponding to the print positions in column one. Finally, column four gives the Mother Board pin numbers corresponding to the print positions in column one. The contact numbers on the LHD boards agree with the pin numbers on the Mother Board.

NOTE

Terminal numbers in the top hammer bank connector identify the coil positions on the associated coil bank. For example, terminal number 16 in the connector represents the 16th coil (from left to right) in the associated coil bank.

TABLE 5-8
HAMMER COIL TO MOTHER BOARD CONNECTIONS

COIL BANK POS. 1 ("A" ODD)				COIL BANK POS. 2 ("B" EVEN)				COIL BANK POS. 3 ("B" ODD)				COIL BANK POS. 4 ("A" EVEN)			
Print Position	Terminal No. in Top Hammer Bank Connect.	Terminal No. in Bottom Hmr. Bank Connec.	Mother Board Pin No.	Print Position	Terminal No. in Top Hammer Bank Connect.	Terminal No. in Bottom Hmr. Bank Connec.	Mother Board Pin No.	Print Position	Terminal No. in Top Hammer Bank Connect.	Terminal No. in Bottom Hmr. Bank Connec.	Mother Board Pin No.	Print Position	Terminal No. in Top Hammer Bank Connect.	Terminal No. in Bottom Hmr. Bank Connec.	Mother Board Pin No.
1	1	2	A01	2	1	2	B01	3	1	2	B01	4	1	1	A02
5	2	1	A02	6	2	1	B02	7	2	1	B02	8	2	4	A03
9	3	4	A03	10	3	4	B03	11	3	4	B03	12	3	3	A04
13	4	3	A04	14	4	3	B04	15	4	3	B04	16	4	6	A05
17	5	6	A05	18	5	6	B05	19	5	6	B05	20	5	5	A06
21	6	5	A06	22	6	5	B06	23	6	5	B06	24	6	8	A07
25	7	8	A07	26	7	8	B07	27	7	8	B07	28	7	7	A08
29	8	7	A08	30	8	7	B08	31	8	7	B08	32	8	10	A09
33	9	10	A09	34	9	10	B09	35	9	10	B09	36	9	14	A13
37	10	14	A13	38	10	14	B13	39	10	14	B13	40	10	13	A14
41	11	13	A14	42	11	13	B14	43	11	13	B14	44	11	16	A15
45	12	16	A15	46	12	16	B15	47	12	16	B15	48	12	15	A16
49	13	15	A16	50	13	15	B16	51	13	15	B16	52	13	18	A17
53	14	18	A17	54	14	18	B17	55	14	18	B17	56	14	36	A35
57	15	36	A35	58	15	36	B35	59	15	36	B35	60	15	38	A37
61	16	38	A37	62	16	38	B37	63	16	38	B37	64	16	35	A36
65	17	35	A36	66	17	35	B36	67	17	35	B36	68	17	40	A39
59	18	40	A39	70	18	40	B39	71	18	40	B39	72	18	37	A38
73	19	37	A38	74	19	37	B38	75	19	37	B38	76	19	42	A41
77	20	42	A41	78	20	42	B41	79	20	42	B41	80	20	39	A40
81	21	39	A40	82	21	39	B40	83	21	39	B40	84	21	44	A43
85	22	44	A43	86	22	44	B43	87	22	44	B43	88	22	41	A42
89	23	41	A42	90	23	41	B42	91	23	41	B42	92	23	43	A44
93	24	43	A44	94	24	43	B44	95	24	43	B44	96	24	47	A48
97	25	47	A48	98	25	47	B48	99	25	47	B48	100	25	50	A49
101	26	50	A49	102	26	50	B49	103	26	50	B49	104	26	49	A50
105	27	49	A50	106	27	49	B50	107	27	49	B50	108	27	51	A52
109	28	51	A52	110	28	51	B52	111	28	51	B52	112	28	56	A55
113	29	56	A55	114	29	56	B55	115	29	56	B55	116	29	55	A56
117	30	55	A56	118	30	55	B56	119	30	55	B56	120	30	58	A57
121	31	58	A57	122	31	58	B57	123	31	58	B57	124	31	57	A58
125	32	57	A58	126	32	57	B58	127	32	57	B58	128	32	60	A59
129	33	60	A59	130	33	59	B60	131	33	59	B60	132	33	59	A60

LHD PRINTED WIRE BOARD (PWB) TROUBLESHOOTING

INTRODUCTION

Field service of the LHD printed wire board can be carried out by authorized service personnel. Failures can be quickly recognized as occurring on the LHD board or on the LOG board. To quickly recognize the failure area, you must understand the individual hammer solenoid circuit operation coupled with groups of circuits functioning together. With this knowledge, a test printout can furnish an identification of the failed circuit.

NO PRINT IN ALTERNATE PRINT POSITIONS

This failure is most easily identified as either all even column print positions are blank, or all odd column print positions are blank. In either case, the alternate column positions contain a printed character.

The most logical failure is that either FOH or FEH is not being generated by the LOG PWB. Other causes could be that the signal line on the affected LHD PWB is broken after the control signal entered the B54 pin connection on the LHD PWB. The affected control signal could have become grounded to 0 volts. Any of these causes will generate the same failure identification pattern.

A secondary failure can be that the controlling HVS PWB cannot generate the required bus voltage for all even or all odd circuits.

A BLOCK OF SIXTEEN PRINT POSITIONS MISSING

The printed sheet contains printed characters in all columns except a continuous group of print positions in column 1 - 15 or 16 - 31 or 32 - 47 or 48 - 63 or 64 - 79 or 80 - 95 or 96 - 111 or 112 - 120 or 121 - 132. Since only 16 print positions do not print, the affected function can be readily identified as one of the incremented-by-16 hammer drive signals. The signal is easily identified by observing which column is missing first. As an example, if print positions 96 - 111 are missing, then the hammer drive signal, H96, must be at fault.

The most logical cause of this failure is that the affected signal cannot be switched from -12 volts by the LOG PWB. Since there are no operating voltages (-15 volts) applied to the LHD PWB, it is illogical to assume that the failure occurred directly on the LHD PWB. This failure is also recognized as affecting both LHD/ODD and LHD/EVEN PWB's.

A BLOCK OF TWO PRINT POSITIONS MISSING FROM EVERY BLOCK OF SIXTEEN

The printed sheet contains printing in every print position except two in the first group of print position 1 - 15 (except position 1, which could have failed). In the 15th print position from last missing print, two more positions are missing, with this pattern following across the printed sheet. As an example, if print positions 2 and 3 are missing, with positions 18 and 19, 34 and 35, 50 and 51, 66 and 67, 82 and 83, 98 and 99, 114 and 115, 130 and 131, also missing, the described pattern exists. The signal common to these circuits is hammer drive signal $\overline{H2}$.

The most logical cause of this failure is that the affected signal cannot be switched from -12 volts by the LOG PWB. The affected signal in this case will be an incremented-by-2 hammer drive signal, common to each array of 16 circuits. This failure is recognized as affecting both LHD PWB's.

EXCESS PRINTING IN A BLOCK OF SIXTEEN PRINT POSITIONS

The printed sheet contains excess overprinting within only one block of 16 print positions, although all other positions print normally. As an example, positions 1 - 15 are illegible because of excessive overprinting, but positions 16 through 132 are printed normally. Since the failure affects both LHD PWB's, it can be identified as an incremented-by-16 hammer drive signal, specifically, the $\overline{H0}$ hammer drive signal.

The most logical cause of this failure is an open from the LOG PWB on an incremented-by-16 hammer drive signal line. When the other arrays of 16 print positions are being enabled by the incremented-by-2 signals, the affected array is enabled sequentially during the enabling of every other array because the incremented-by-16 line no longer holds off the gate circuits after that group has been enabled and fired.

An alternate condition similar to this failure is that every other position within a block of 16 positions overprints. This failure can be reduced to the affected LHD PWB as a possible open after the hammer drive signal was distributed to the LHD PWB. Identification of the LHD PWB can be easily made by whether the overprint is in even columns or odd columns.

EXCESS PRINTING IN BLOCKS OF TWO EVERY FIFTEEN PRINT POSITIONS

The printed sheet contains overprinting within 2 print columns in every block of 16 columns, with the overprinting starting 15 print positions from the preceding overprint position. As an example, overprinting occurs in positions 1, 16 and 17, 32 and 33, 48 and 49, 64 and 65, 80 and 81, 96 and 97, 112 and 113, 128 and 129. All other positions print normally. Since the failure affects both LHD PWB's, it can be identified as an incremented-by-2 hammer drive signal, specifically, the $\overline{HZ}$ hammer drive signal.

The most logical cause of this failure is an open from the LOG PWB on an incremented-by-2 hammer drive signal line. When the other print positions within the individual block of 16 are enabled and fired, the affected two positions will also fire so long as the incremented-by-16 hammer drive signal is active. Therefore, there will be eight overprints on each overprinted position, that is, eight even and eight odd firings for the group of 16.

An alternate condition similar to this failure is that every print position within a block of 16 prints correct except one that overprints. Sixteen positions later, another overprint occurs, with this pattern repeating across the printed sheet. This failure can be reduced to the affected LHD PWB as a possible open after the hammer drive signal was distributed to the LHD PWB. Identification of the LHD PWB can easily be made by whether the overprint is in an even or an odd print column where overprinting occurs.

EXCESS PRINTING IN ONE POSITION ON THE PRINT LINE

The printed sheet contains overprinting in one print position, while all other print positions are printed correctly. This failure can be caused by either an incremented-by-16 or an incremented-by-2 open diode or an LHD PWB. When the overprinting occurs in even columns, the LHD/EVEN PWB is at fault. Overprinting in odd columns identifies the PWB as LHD/ODD.

To determine whether the fault is an incremented-by-16 diode or an incremented-by-2 diode, the data input to the Corresponder must be in the form of a character, then a line feed until all 132 print positions have been printed. When the overprinted position is identified as occurring once for each block of 16 characters printed, the fault is an incremented-by-16 diode. If the overprinting occurs only during the period that printing cccurs within the group enabled by an incremented-by-16 command, then the fault is an incremented-by-2 diode.

Examples of these two conditions are that during the print of the first 15 characters, the overprint occurs (if not in the first 15 positions) once. As the next 16 characters are printed, again the overprint occurs in the column at fault. This pattern, when completed, identifies the fault as an incremented-by-16 diode. The other print pattern that identifies the fault as an incremented-by-2 diode could be that while printing the first 15 characters, every other time a character is printed out in one column where overprinting is known to occur. All other blocks of 16 positions print correctly.

NO PRINTING IN FOURTEEN POSITIONS ON THE PRINT LINE

The print sheet contains correct printing in all columns, except 14 print positions within a group enabled by an incremented-by-16 signal. Two of the positions within that group print correctly. This identifies the failure as a shorted incremented-by-16 diode.

When the incremented-by-2 hammer drive signal at the gate wherein the incremented-by-16 diode is shorted is enabled, the -12 volt bias is removed during the period of both the even and odd period. Thus, two positions of 14 will print since the -12 volts is not coupled back onto the incremented-by-16 line during that period. During the remaining period that the

affected block of 16 positions should have been enabled, the -12 volts disables the incremented-by-16 line.

NO PRINTING IN TWO POSITIONS IN EVERY GROUP OF SIXTEEN EXCEPT ONE

The print sheet contains correct printing in all positions except that within every group of 16 print positions, two print positions do not print. In one group of 16 print positions, all the print positions print correctly. This identifies the failure as a shorted incremented-by-2 diode.

As explained above for a shorted incremented-by-16 diode, printing occurs within the affected group when the source of the -12 volts bias is removed. Thus, until printout occurs within the faulted group, all groups will have two print positions biased off. Switching on the affected incremented-by-2 signal, while its corresponding incremented-by-16 signal at the affected gate is on, permits printing.

SECTION 3

PARTS REPLACEMENT AND ADJUSTMENTS

WARNING

DISCONNECT ALL POWER FROM THE CORRESPONDER BEFORE REMOVING OR REPLACING ANY PARTS.

INTRODUCTION

The following parts replacement, adjustment, and lubrication instructions apply to the TermiNet 510 Corresponder. Any omission of instructions covering replacement or adjustment of particular parts or subassemblies is intentional, and should be understood to mean that those particular procedures should not be attempted in the field.

CAUTION

The alignment bars attached to either end of the hammer and print belt asembly plus the mating alignment bars attached to the side frames are set at the factory on special fixtures. These cannot be adjusted in the field.

Instructions are also omitted for replacement of certain minor parts such as mechanical latches, hinges, linkages, etc. as replacement procedures for these parts should be obvious to the serviceman.

Also note that no instructions are included for removal of the main frame from the bottom cover. The TermiNet 510 Corresponder is designed to permit all servicing without removal of the main frame.

In running any print tests to check the operation of the Corresponder, always be sure that an ink ribbon cartridge is installed.

CAUTION

Operating the Corresponder without a ribbon installed may result in excessive print finger wear. Failure to observe this caution will void Corresponder warranty.

To ensure type fingers are not caught in ink ribbon, rotate print belt one complete revolution by manually rotating motor belt counterclockwise. This precaution should be repeated each time a service routine requires removal of the ribbon cartridge.

BUSTLE BOARDS
(Figure 5-7)

Before attempting to replace a bustle board, the following precautions should be read and understood.

HANDLING OF PRINTED WIRE BOARDS

The Printed Wire Boards used in the Corresponder are normally very reliable. However, it is possible to damage boards by improper handling, shipping, storing, or with contamination from dust or grease. In addition, boards containing an integrated circuit chip (IC) may be damaged by an electrostatic discharge (static electricity), especially in a low-humidity environment. The following guidelines for working with printed wire boards are suggested to avoid board damage.

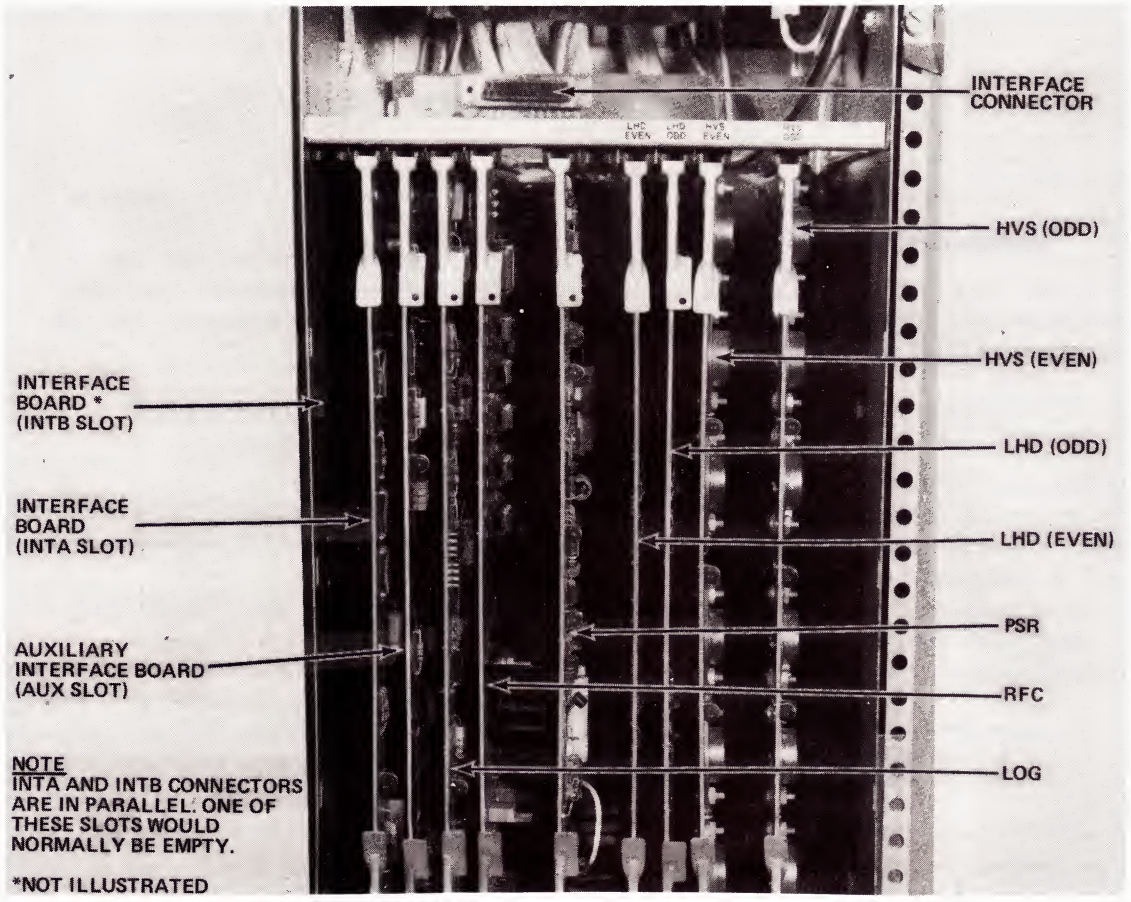
1. Do not subject boards to unnecessary shock or vibration. Be careful when handling boards to avoid dropping.

2. Store boards only in clean, dry, and oil or grease free areas. Avoid storing boards near electrostatic copiers or other devices capable of generating static electricity.

3. Do not store, ship, or transport boards loose. Boards containing an IC should be stored, transported, or shipped only in metallic foil-lined bags or metallic foil wrappings. Other boards may be stored, transported, or shipped in foil-lined bags, plastic bags, or plastic sheeting.

4. Avoid stacking boards on top of each other in storage; store in a vertical position if possible.

5. Always handle boards by their edges. Handling in any other manner can contaminate boards or cause mechanical damage to components.



797-27-1210

Figure 5-7. Bustle Assembly

6. Do not touch plated contact fingers. Contamination can cause intermittent contact problems.

7. When handling boards containing an IC, avoid wearing nylon or other static-producing clothing, especially in very cold or dry weather. If available, wear anti-static smocks. If you are wearing static-producing clothing, and an anti-static smock is not available, remember to touch a grounded surface before handling boards containing an IC.

8. When working on boards with an IC, the work station should have a conductive material surface and conductive floormats connected to a common ground. When possible, connect the chip pins or board fingers to the conductive material surface.

9. Ground soldering iron tips and other electrical tools.

BUSTLE BOARD REPLACEMENT

The main electronic circuits for the Corresponder are packaged on eight printed wire boards. These boards are housed in the bustle which is located inside of the pedestal. The following procedures should be followed when replacing a bustle board.

1. Turn power off.

2. Remove front pedestal cover by loosening the two captive screws at top of cover.

3. Loosen screw and release latch on board retainer. Remove retainer.

4. Remove selected board by pulling both handles at top and bottom of board.

5. When board connectors are separated from the mating pins on mother board, the board will easily slide out of bustle.

6. Insert replacement board in proper bustle slot and push in with thumbs until board is fully seated.

7. Replace board retainer.

8. Turn power on, and check for correct board operation.

9. Turn power off, and replace front pedestal cover.

BUSTLE ASSEMBLY
(Figure 5-7)

The instructions below are given with the assumption that the reader is facing the rear of the pedestal unless specified otherwise.

1. Disconnect power plug from AC power source.

2. Remove front and rear pedestal covers.

3. Loosen the four bustle cover screws at rear of bustle. Lift up and remove cover.

4. Remove the two ground wires secured with a hex head screw, star washer and nut from left side of pedestal frame.

5. Remove AC power connector at top left of bustle.

6. Remove the three hex head screws along with star washers and flat washers securing the four cable clamps to bustle frame.

7. Remove bell connector.

8. Remove ground wire secured with a slotted screw, two star washers, and a nut from left side of pedestal.

NOTE

The hammerbank, control panel, and photocell connectors each contain two small retaining screws which must be removed before the connectors can be removed.

9. Remove the four hammerbank connectors from center of mother board.

10. Remove control panel connector from bottom right of mother board.

11. Remove the photocell connector from bottom left of mother board. This connector is keyed to avoid incorrect connector placement.

12. Remove single orange wire from right side of mother board.

13. Remove the red and black wires from left side of mother board.

14. Facing the front of the pedestal, remove the four slotted screws securing bustle frame to pedestal. Slide bustle out from rear of pedestal.

CAUTION

When storing or working on bustle assembly, take necessary precautions to avoid damage to connecting pins on mother board.

15. To replace bustle assembly, reverse steps 3 through 14 above.

CAUTION

All wires connected to the mother board terminal tabs with sleeve type connectors must fit tight. If any are loose, the connectors should be closed up slightly to obtain a good fit with their mating terminals.

16. Connect power plug to AC power source, and check operation of Corresponder.

17. Replace pedestal covers.

TOP COVER
(Figure 5-8 and Figure 5-9)

1. Remove paper rack by squeezing the mounting arms together and sliding them off the mounting studs.

2. Remove the hex nuts on either side of the Corresponder main frame that secure the two top cover ground wires, and remove the star washers and the wires.

3. On the rear, inside of the top cover, make a pencil mark around cover hinge arm.

4. Loosen the three slotted screws on each top cover hinge arm and remove the rear screw.

NOTE

The two front screws of each hinge arm do not need to be removed.

5. Slide cover toward the rear to remove it from the hinge arm.

6. Replace the top cover by reversing steps 1, 2, 3, 4, and 5.

PAPER SHIELD ASSEMBLY (Figure 5-9)

The plastic paper shield assembly is easily replaced as follows:

1. Open top cover.

2. Gently squeeze the plastic mounting arms inward to free the shield assembly from the top cover.

3. Replace paper shield assembly by reversing above steps.

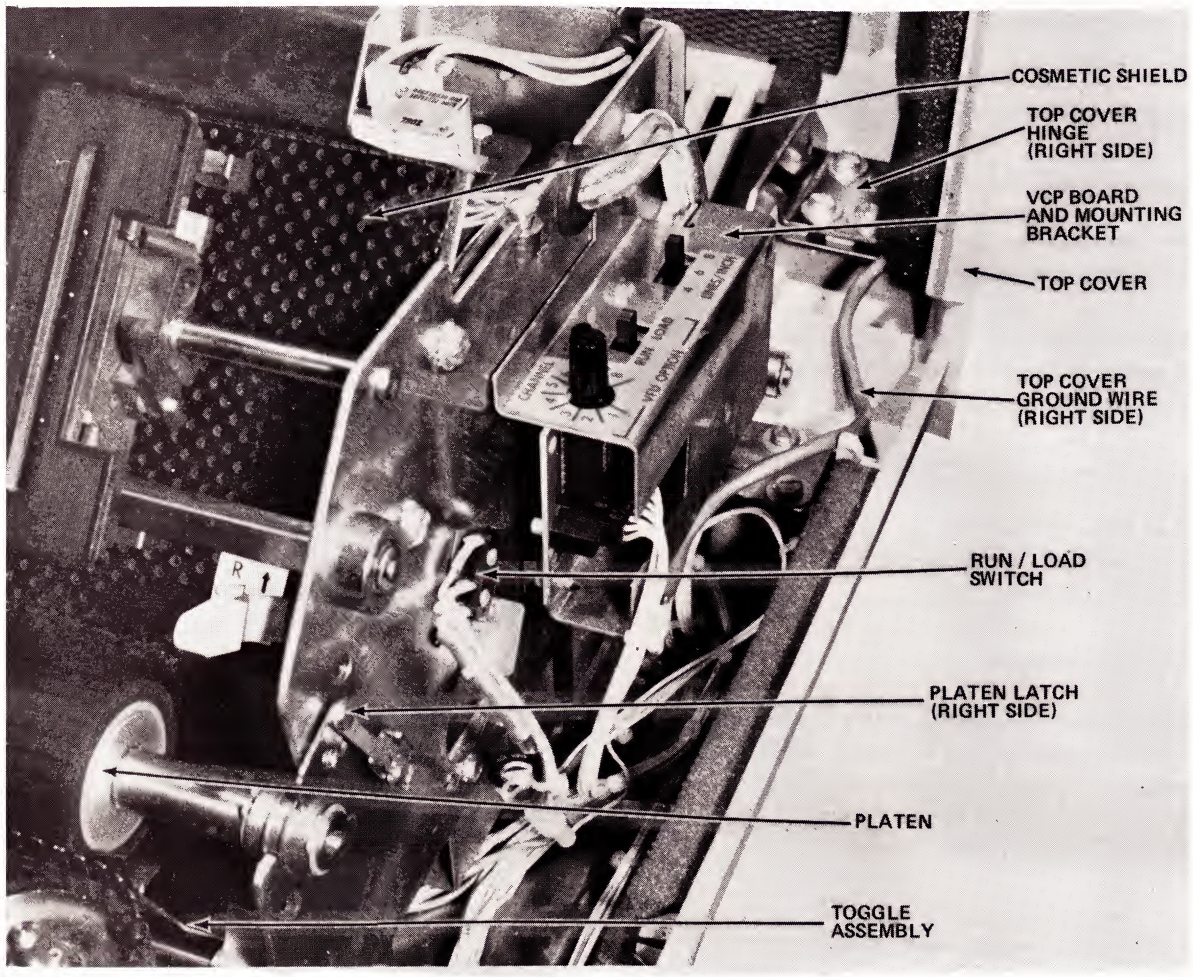


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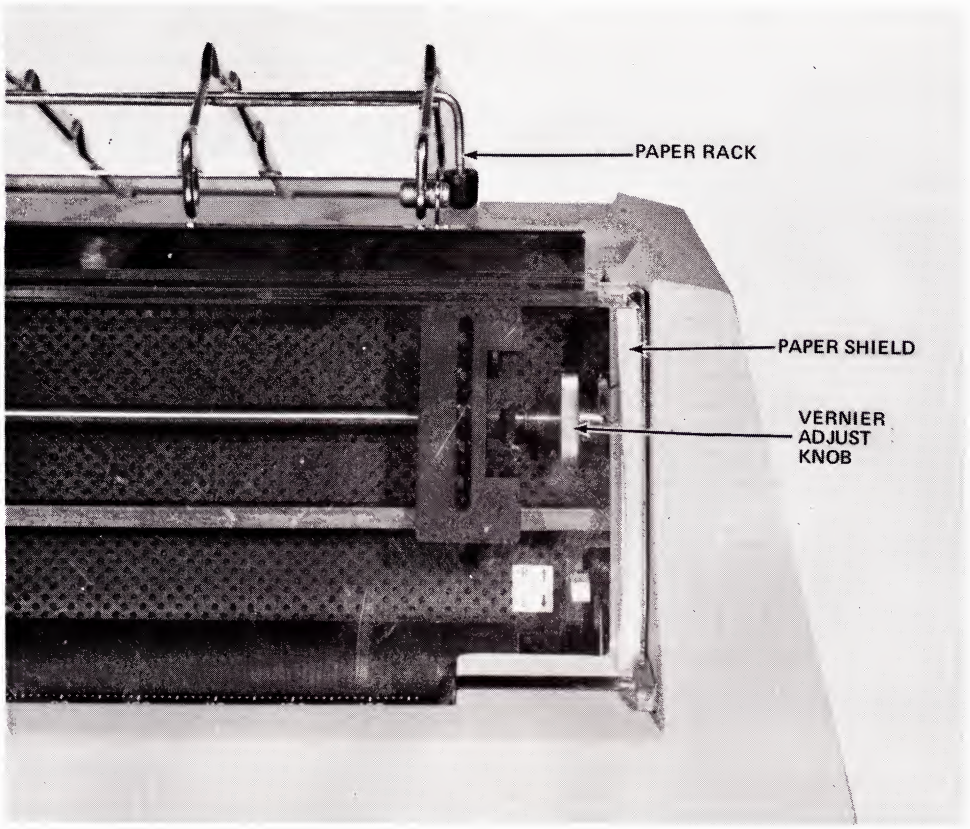
Figure 5-8. Right Rear Side of Corresponder



789-7-1022

Figure 5-9. Paper Shield and Rack

FAN DUCT
(Figure 5-10)

1. Remove the top cover.
2. Loosen the six hex head screws that hold the fan duct in place.
3. Remove the hex head screw that holds the top cover interlock switch cable clamp.
4. Lift duct straight up to free six keyhole slots from the loosened six hex head screws.
5. Remove grommet for top cover interlock switch cable from fan duct.
6. Replace fan duct by reversing the above steps.

NOTE

Care should be taken, when reinstalling the fan duct, to ensure that the grommet for the top cover interlock switch cable is installed properly.

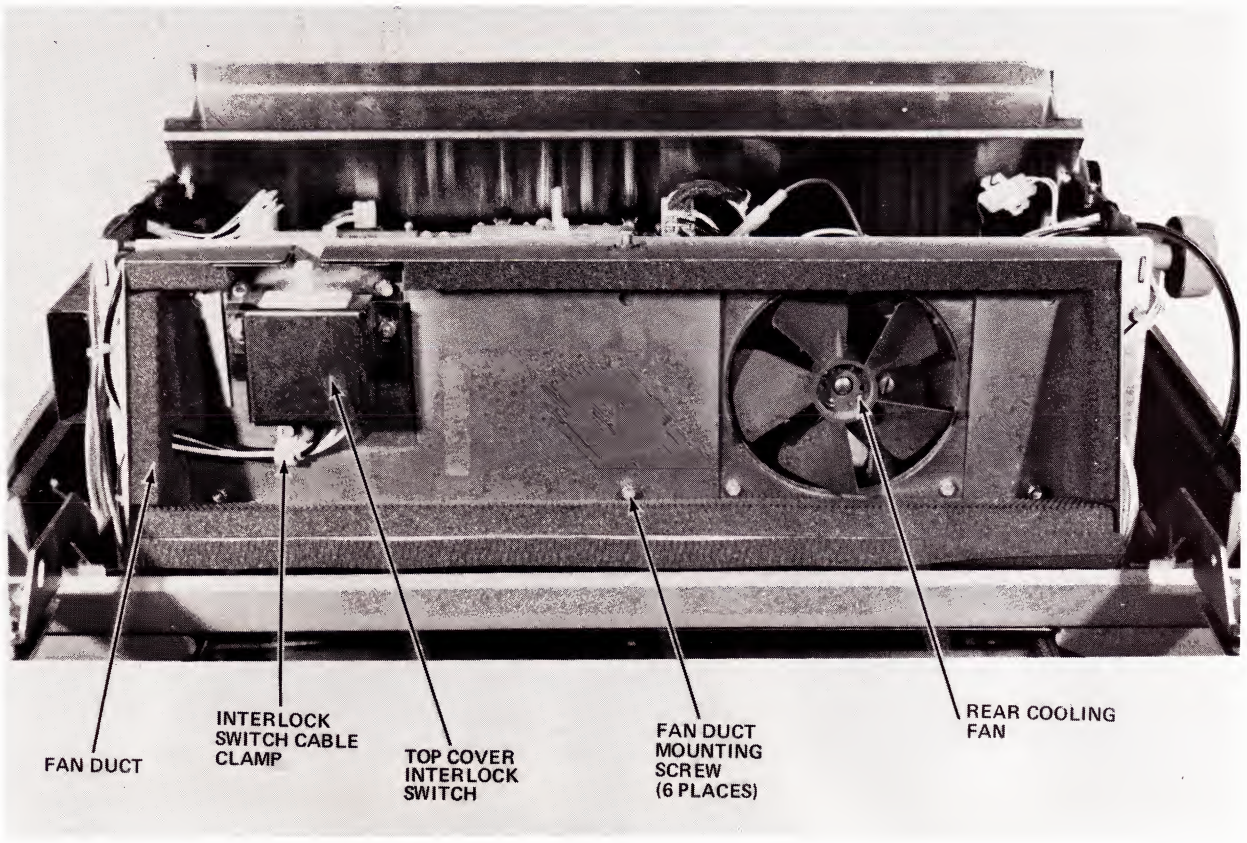


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Figure 5-10. TermiNet 510 Corresponder Rear View (With Top Cover Removed)

FRONT PANEL AND LCP BOARD (Figures 5-11 and 5-12)

1. Open top cover.

2. Remove four screws and flat washers from underside of front panel.

NOTE

Keep these screws separate from top mounting screws.

3. Remove two screws, star washers, and ground wire from each end of top control panel brackets.

CAUTION

Slide panel to the extreme right and lift the left side slightly until it clears the bottom printer cover. Do not use force, as damage may result to the cooling fan motor coil.

4. Lift up control panel and flip it over exposing the connector on the LCP board.

5. Remove hex nut and star washer for front panel ground wire.

6. Remove two small retaining screws from connector on LCP board and remove connector.
7. Lay control panel face down on a padded work surface.
8. Remove the six LCP board mounting screws and flat washers. Lift LCP board away from control panel.
9. Replace LCP board and control panel by reversing steps 4 through 7 above.

CAUTION

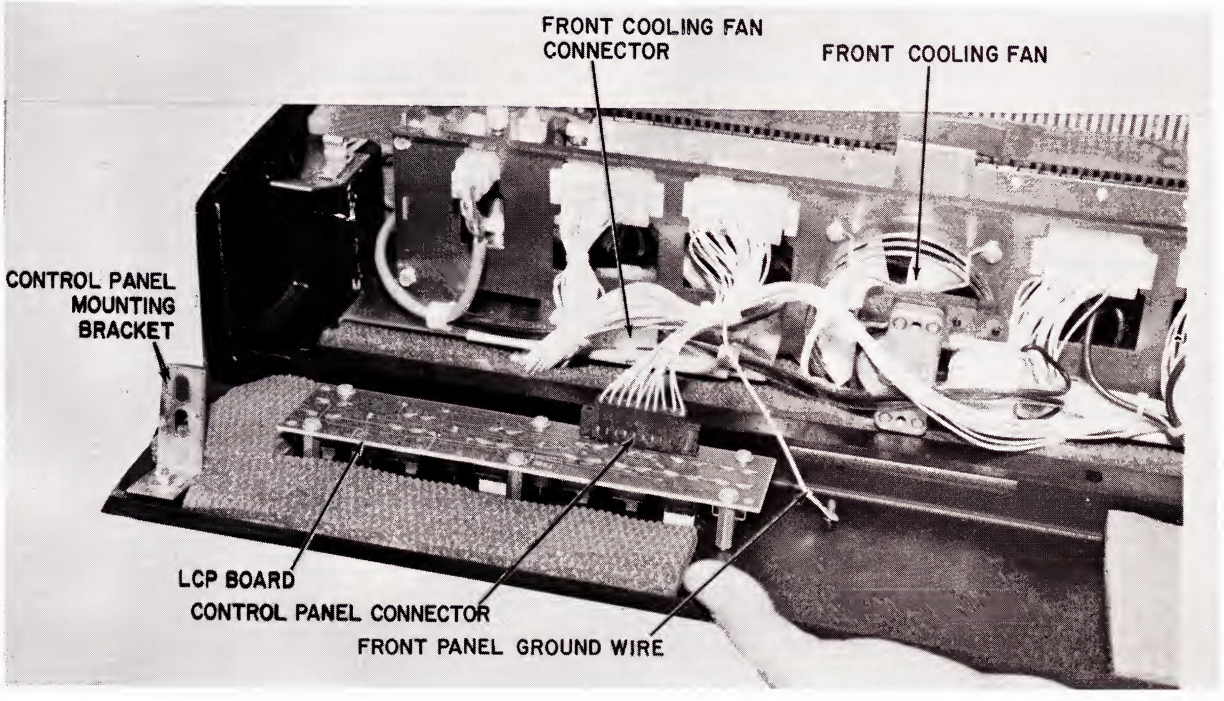
When installing the front panel, tip and slide the panel as necessary to clear the front cooling fan.

10. Check operation.
11. Replace four bottom and four top mounting screws and washers.
12. Close top cover.

LCP BOARD SWITCHES AND INDICATORS (Figure 5-13)

The pushbutton switches and LED indicators on the control panel can be replaced as follows:

1. Remove control panel.
2. Remove LCP board from control panel.
3. Locate defective switch or indicator. If removing a switch, cut switch terminals under switch and remove piece of each terminal remaining in the board one at a time using a small tip soldering iron to melt solder. If replacing an LED indicator, hold soldering iron on soldered leads of LED on solder side of board until solder melts and pull LED along with LED sleeve off board.
4. When installing a replacement LED indicator, make sure removed sleeve is installed with LED. This will provide support and assure correct mounting height for the LED.
5. When installing a replacement switch, position switch so that uppermost part of switch (pushbutton cap removed) is 0.8 in. (2.0 cm) from board surface. Ends of switch terminals on solder side of board should be bent over before soldering terminals in place.
6. Mount LCP board to control panel and position panel in Corresponder.
7. Check operation of all control panel switches and indicators.
8. Secure control panel with the eight mounting screws previously removed.



PLH-7024

Figure 5-11. Front Panel and LCP Board

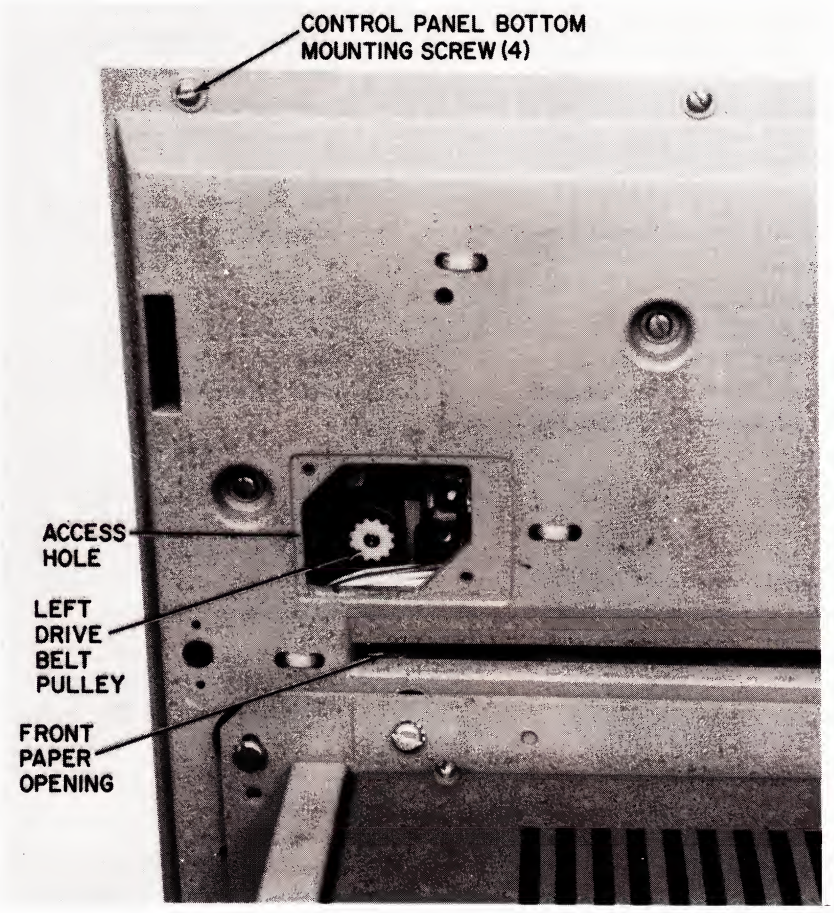


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Figure 5-12. Access Hole

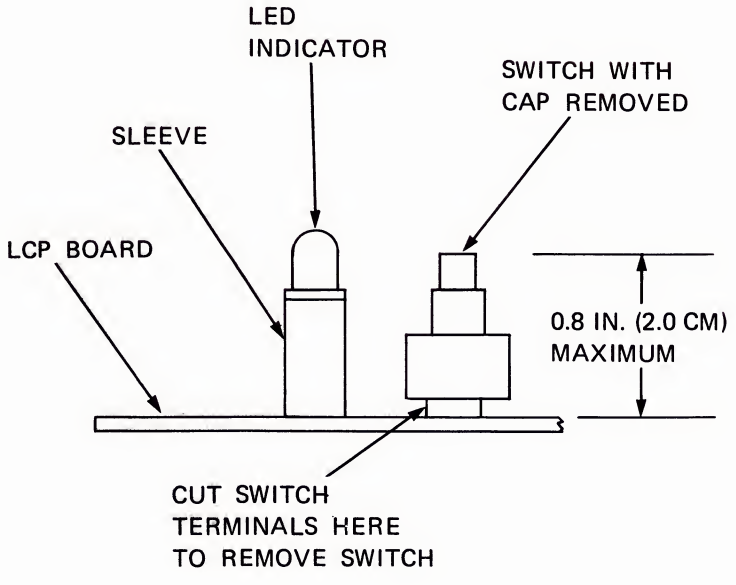

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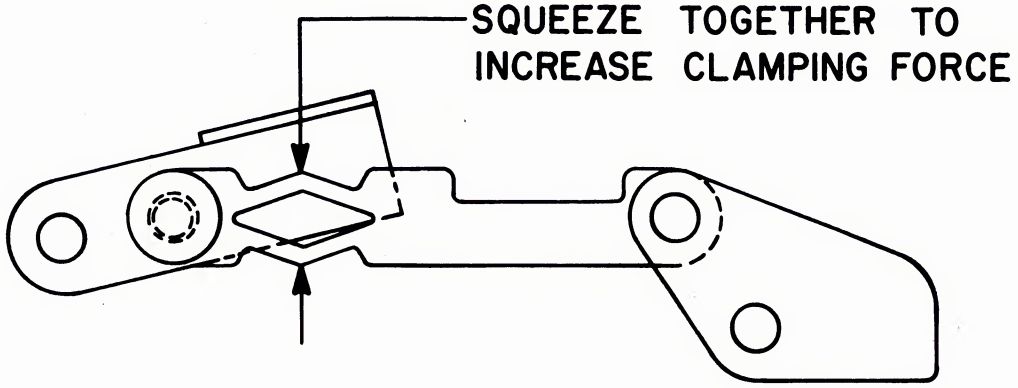
Figure 5-13. Switch and Indicator Replacement



PLH-7020

Figure 5-14. Adjusting Platen Clamp Assembly

PLATEN
(Figure 5-8)

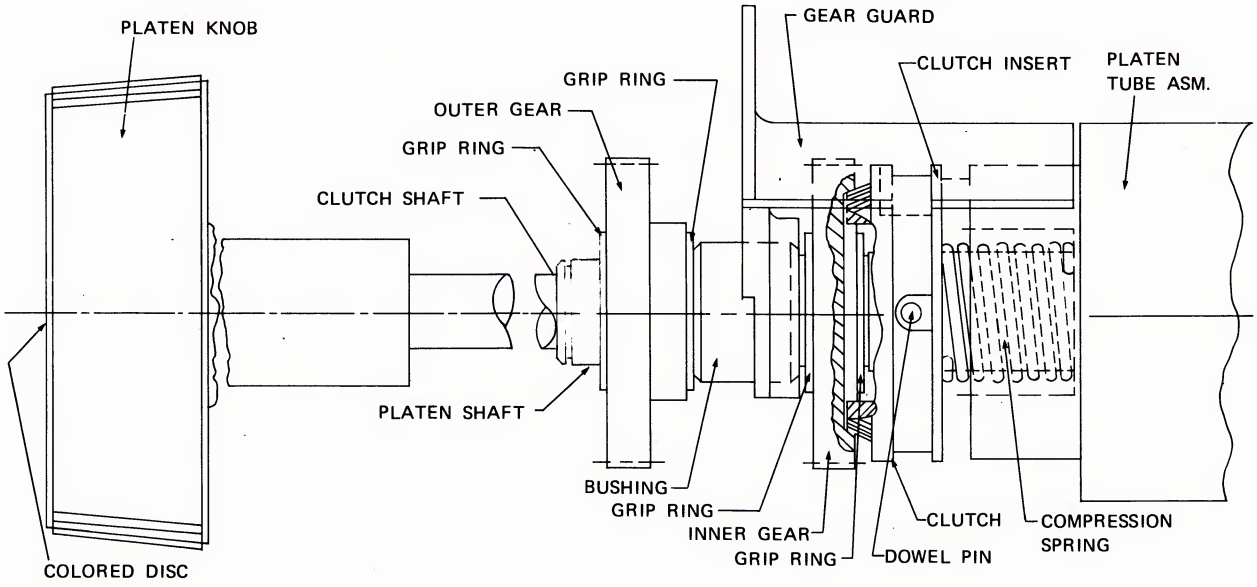
1. Open top cover and remove paper.
2. Release both platen latches on either side of main frame.
3. Carefully lift right end of platen up enough to clear right side frame.
4. Slide platen to right as far as possible.
5. Carefully lift left end of platen up until it is free.
6. When replacing platen, lower left end down so that platen gear is beside and to the right of its mating gear. Make sure plastic guard at left is on top over platen gear.
7. Lower right end of platen down until it is almost resting on right side frame.
8. Carefully slide platen to left while rotating platen slightly to mesh platen gear with mating gear.
9. Lower right end of platen down until it is seated into notch in right side frame.
10. Lock platen latch on each side of main frame. If latches do not clamp platen tight enough to prevent bearings from turning on main frame, adjust them by gently squeezing diamond shaped portion of arm as illustrated in Figure 5-14.
11. Push in on platen knob, and rotate counterclockwise to check operation.
12. Replace paper and close top cover.

PLATEN REPAIR
(Figures 5-15 and 5-16)

The platen assembly can be repaired by breaking it down into its separate piece parts, and replacing any of the individual parts found defective.

DISASSEMBLY

1. Push dowel pin out of clutch assembly (see Figure 5-15) and remove clutch shaft with attached platen knob from platen assembly.
2. Remove outer grip ring from platen shaft.



PLH-6124

Figure 5-15. Platen Assembly Detail – Left End

3. Slide outer gear off platen shaft. If any shims drop out, retain these for reassembly. The shims, if used, go between the flats on the gear and shaft to take up any slack that may exist. This will assure a tight fit between gear and shaft.

4. Remove grip ring from platen shaft securing gear guard and bushing. Slide gear guard and bushing off shaft.

5. Remove grip ring securing inner gear to platen shaft, and slide gear, clutch assembly, and compression spring off shaft.

6. Remove grip ring from right end of platen shaft and slide bushing off shaft.

REASSEMBLY

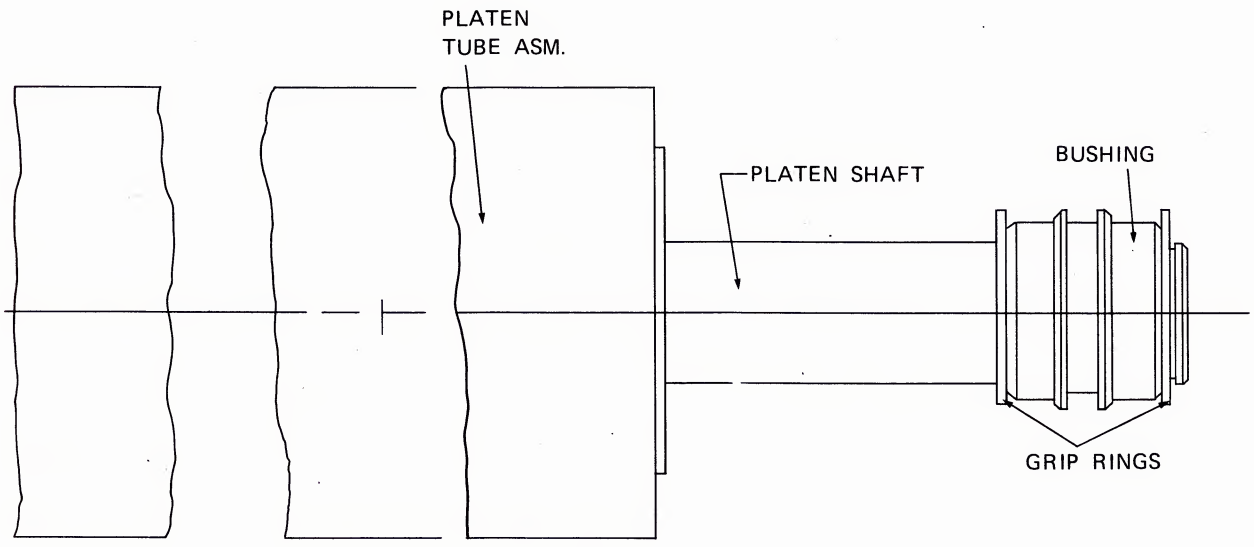
Before reassembly, apply a light coat of grease (Lubriplate #630-AA, ME-D6A3) on the inside surfaces of the right and left bushings. Also, apply a small amount of grease on the clutch shaft. Work the grease in between the platen shaft and clutch shaft by moving the clutch shaft in and out several times.

1. Slide grooved bushing over platen shaft on right end of platen shaft, and secure in place with a grip ring.

2. Slide compression spring, clutch assembly (gear side facing out), and inner gear over left end of platen shaft. Align clutch with pin in left end of platen tube assembly.

3. Install grip ring securing inner gear to platen shaft.

4. Slide bushing and gear guard onto platen shaft and secure in place with grip ring.



PLH-6125

Figure 5-16. Platen Assembly Detail — Right End

PAPER HANDLER TRACTOR (Figure 5-17)

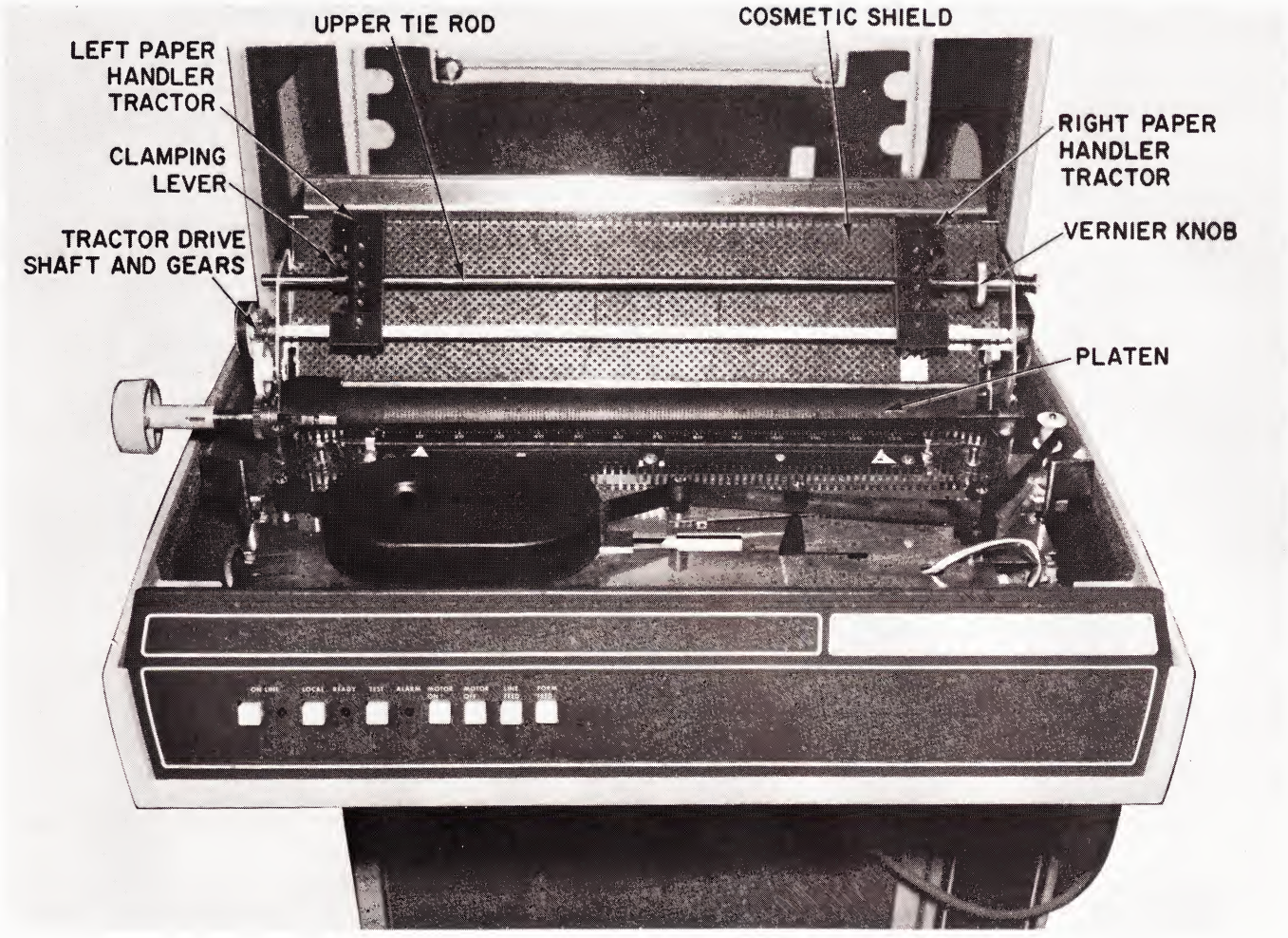
1. Open top cover.
2. Remove paper.
3. Unlock each tractor by pushing down on clamping levers.
4. Remove outside retaining ring from right end of upper tie rod, and remove washer and spring.
5. Slide upper tie rod to left until right end is clear of side frame and remove tie rod from Corresponder with attached thumb wheel. Thumb wheel can be removed from shaft by screwing it off end of shaft.
6. Remove E ring from right end of square tractor drive shaft.
7. Gently tap the right end of the square tractor drive shaft to remove the Oilite bearing from the main frame.
8. Slide the shaft to the left and remove the tractors.

NOTE

The tractors can be interchanged by making a simple conversion. For example, if only a right hand spare tractor is available and the left hand tractor needs replacing, the available tractor can be easily converted to a left hand tractor. To convert a tractor, see the instructions below.

NOTE

The gears and bearing may be removed from the shaft for replacement.



314-20-1100

Figure 5-17. Paper Handler Tractors

9. To replace tractors, start square drive shaft through hole in left main frame. Then slide left tractor onto square shaft followed by right tractor. Engage gear on left end of shaft with mating gear while sliding right end of shaft through roller clutch. Do not attach E ring to right end of shaft until later.

NOTE

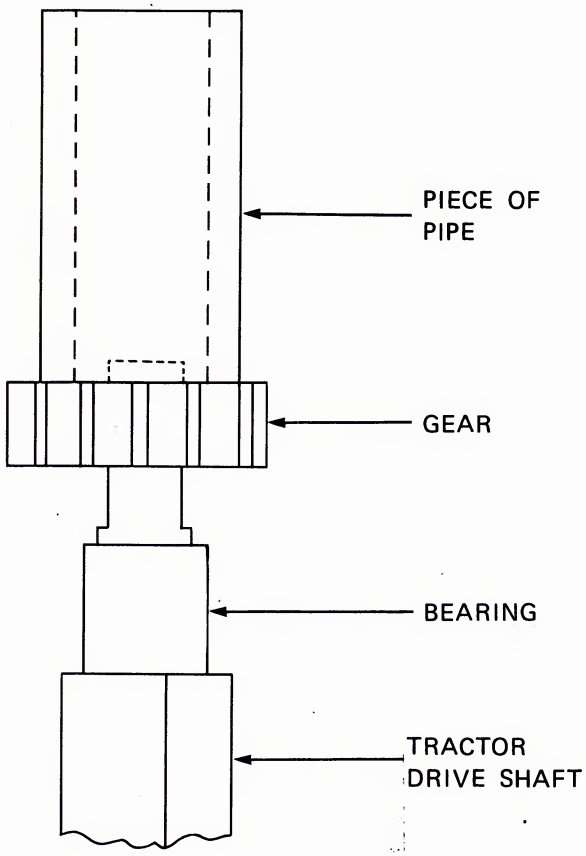
When inserting square shaft, ensure that the phasing marks on the paper tractor bearings are aligned.

10. Slide upper tie rod through the hole in the left side frame and both paper tractors. Attach vernier knob, then slide rod through hole in right side frame and install spring washer and retaining ring on right end of rod.

11. Install paper, adjust tractors, lock tractors in place by pushing up on clamping levers, close top cover, and check operation.

TRACTOR DRIVE SHAFT GEAR AND BEARING (Figures 5-17 and 5-18)

1. Open top cover.
2. Remove paper.
3. Remove E ring from right end of square drive shaft.
4. Unlock tractors by pushing down on clamping levers.
5. Slide square drive shaft out from the left side of Corresponder.
6. With tractor drive shaft assembly out of Corresponder, place assembly in a vertical position with gear end facing up. Support bottom of gear with an open end wrench or other suitable tool. Holding tool with supported shaft assembly against a work surface, gently tap shaft extending from gear with a plastic mallet until gear has moved to end of shaft. Gear should now be loose enough so that it can be pulled off the shaft. If replacing entire drive shaft assembly, make sure gear is compatible with mating gears.
7. If bearing is being replaced, it can be done easily at this time as it will slide over end of shaft after gear is removed.
8. With bearing in place, push replacement gear on end of shaft as far as possible. Place shaft on a solid work surface in a vertical position with gear end facing up. Select a socket head nut driver or similar object such as a short piece of pipe which will slide over shaft while making contact with gear surface. Make sure tool does not have a large enough inside diameter to damage gear teeth when tool makes contact with gear. Holding shaft assembly in upright position described above, and with tool in place on gear, gently tap end of tool until gear is seated against shoulder on shaft. Check bearing to make sure it rotates freely on shaft.
9. Replace shaft assembly in Corresponder by sliding assembly in from left side of Corresponder. Slide left and right tractors onto square shaft as shaft is placed in operating position.
10. Visually inspect alignment of pins between left and right tractors and correct alignment if necessary by slipping right tractor off shaft and rotating tractor hub ¼ turn at a time until pins are aligned.
11. Make sure tractor drive shaft gear is properly meshed with mating gear, and place E ring over right end of shaft.
12. Install paper, adjust tractors, lock tractors in place by pushing up on clamping levers, close top cover, and check operation.



PLH-6047

Figure 5-18. Tractor Drive Shaft Gear Replacement

CONVERTING TRACTORS

The tractors are interchangeable. A right hand tractor can be used to replace another right hand tractor, or with a minor conversion, it can be used to replace a left hand tractor. The conversion procedure is as follows:

1. Position tractor on work surface as it would be in Corresponder.
2. Remove cover spring.
3. Press out cover pins (from inside out) and remove cover.
4. Take out Phillips Head screw holding clamp assembly and remove assembly. Rotate clamp assembly so that lever is pointed down, and secure in place with the Phillips Head screw previously removed.
5. Turn tractor over from original position and install cover with the two pins and spring previously removed.

COSMETIC SHIELD
(Figure 5-8)

1. Remove paper.
2. Open top cover.
3. Remove the two hex head mounting screws with star washers from each end of cosmetic shield, and slide shield up out of main frame.
4. Replace by reversing above procedure.

TOGGLE ASSEMBLY
(Figures 5-8, 5-19, and 5-20)

1. Raise top cover.
2. Remove platen.
3. Remove retaining spring from links on each side of toggle assembly.
4. Remove two E rings that secure links on each side of toggle assembly.
5. Slide assembly to left until right end clears sleeve in main frame.
6. Assembly is then removed by sliding it to the right until left end clears sleeve in main frame.
7. Replace toggle assembly by reversing the above steps.
8. Operate the RUN/LOAD lever and observe the toggle assembly action for correct movement.

When the toggle assembly is installed, a minimum of .004 in. (.001 cm) gap must exist on the left side of the Corresponder between the platen and the paper holder. This gap exists when the RUN/LOAD lever is placed in the LOAD position. The RUN/LOAD lever assembly can be adjusted to achieve this required gap. Measure the gap with a feeler gauge. If the gap measures less than .004 in. (.001 cm), proceed as follows:

1. Loosen the screw which secures the RUN/LOAD lever assembly to the Corresponder side frame.
2. Slide the lever assembly in its slotted mounting hole until the proper gap is measured and tighten the securing screw.

CAUTION

Be sure the RUN/LOAD switch still operates properly. Refer to the adjustment procedure concerning this switch.

When the RUN/LOAD lever is placed in the RUN position, the toggle assembly must touch the paper pan on both ends. The tension created by this touch should be between 3-6 oz. (85-170 gm). This tension should be measured at the left and right sides of the paper.

To measure this tension, proceed as follows:

1. Remove the platen from the Corresponder.
2. Install a portion of single part paper in the Corresponder and place the RUN/LOAD lever in the RUN position.

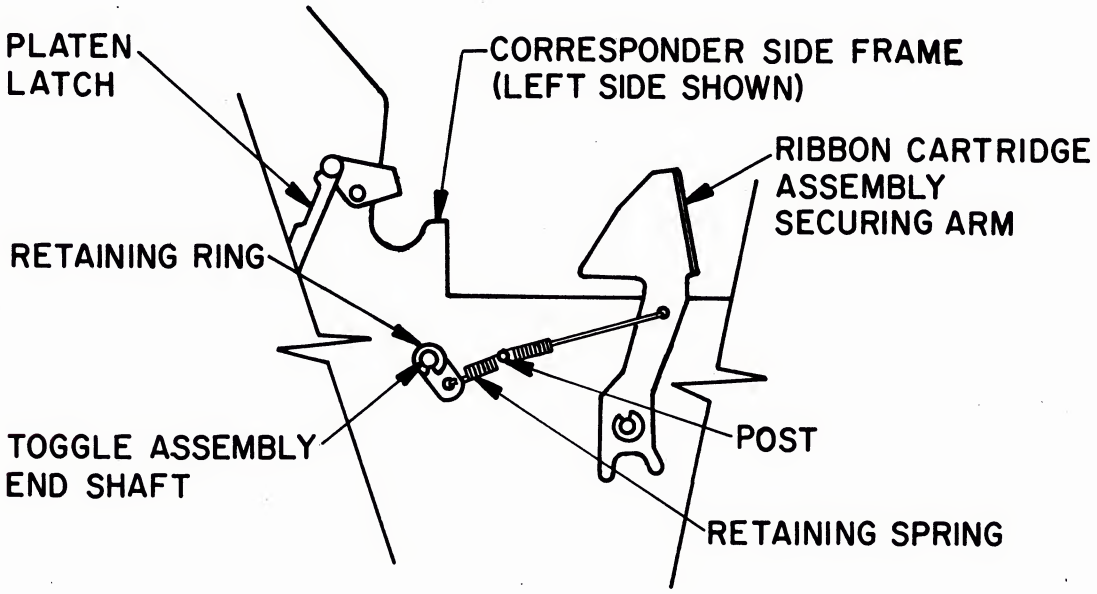


Figure 5-19. Toggle Assembly — Left Side

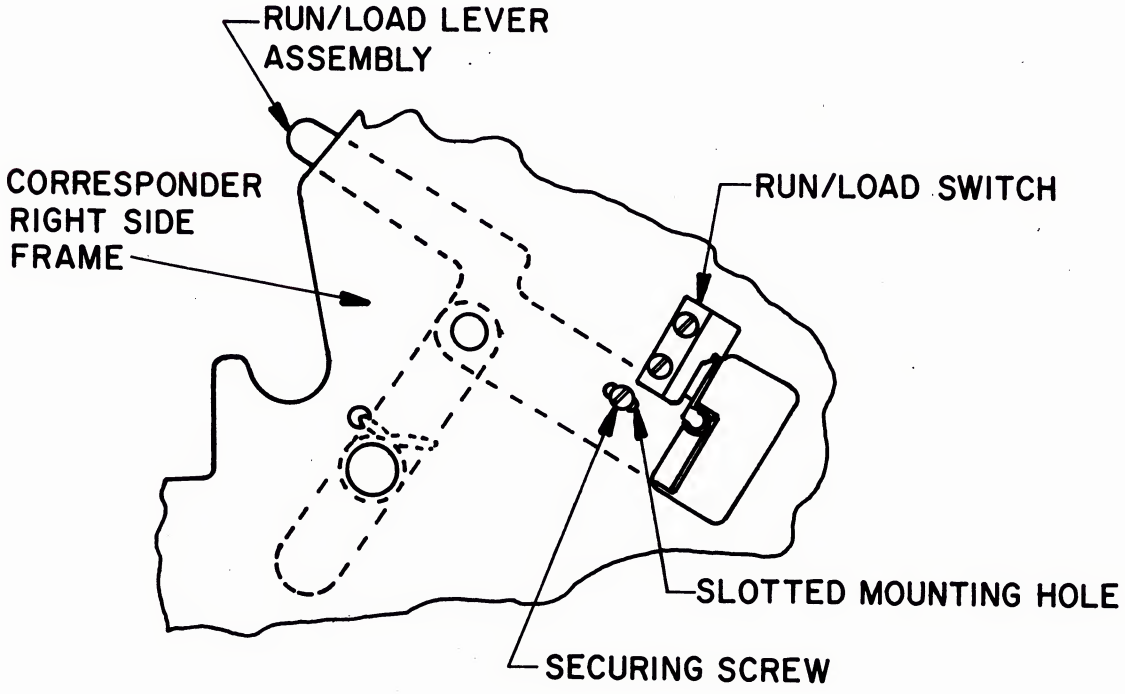


Figure 5-20. RUN/LOAD Lever Assembly

3. Clamp a paper binder clip or similar device on the right and left top edges of the paper.

4. Hook a utility push-pull gauge (such as those made by John Chatillon & Sons, Kew Garden, New York) into the paper binder clip and measure the tension exerted on the paper. Do this by pulling the paper with the gauge until it slips in the Corresponder. Measure the tension on both sides of the paper.

5. The adjustment discussed previously can be varied to achieve the 3-6 oz. (85-170 gm) of tension along with the ≤ 0.004 in. (0.001 cm) gap specification.

NOTE

In extreme cases the paper pan can be bent slightly to bring the tension on both sides of the paper into tolerance.

FRONT LOW PAPER SENSOR
(Figure 5-21)

1. Turn power off.

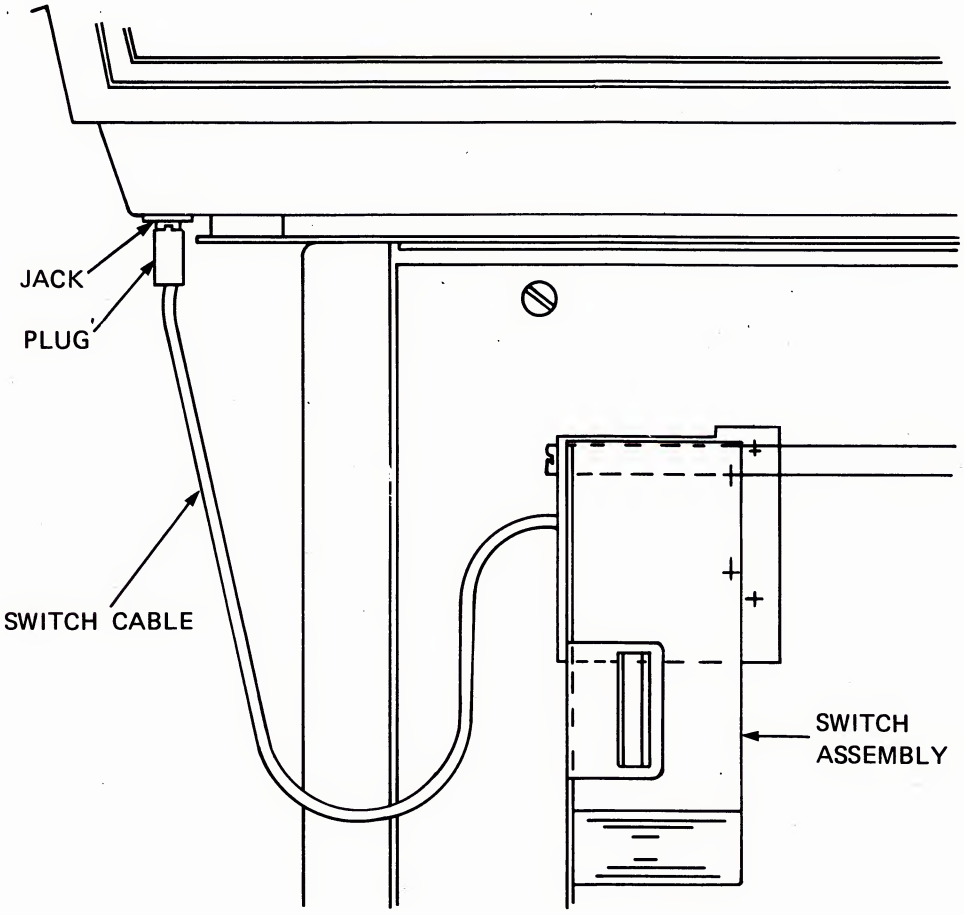
2. Remove plug from jack under left front corner of Corresponder.

3. Remove front pedestal cover.

4. Remove screw securing horizontal bar to switch assembly.

5. Remove switch assembly from pedestal cover.

6. Replace switch assembly by reversing the above steps.



PLH-6037

Figure 5-21. Front Low Paper Switch

REAR LOW PAPER SENSOR
(Figure 5-22)

1. Turn power off.

2. Remove three screws attaching rear paper chute to rear of Corresponder.

3. Slide paper chute with attached switch to left until switch clears Corresponder cover through large cutout.

NOTE

If chute does not slide easily, open top cover and make sure switch wires are not snagged on frame parts.

4. When chute is out far enough to expose switch terminals, remove wires from switch, and remove chute with attached switch as an assembly.

5. Replace switch on paper chute. Switch is attached with two screws.

6. Connect wires to switch terminals.

7. Turn power on, and check for correct operation of switch.

NOTE

To enable rear low paper sensor, remove plug from jack under left front of Corresponder.

8. Turn power off and complete installation of paper chute in Corresponder.

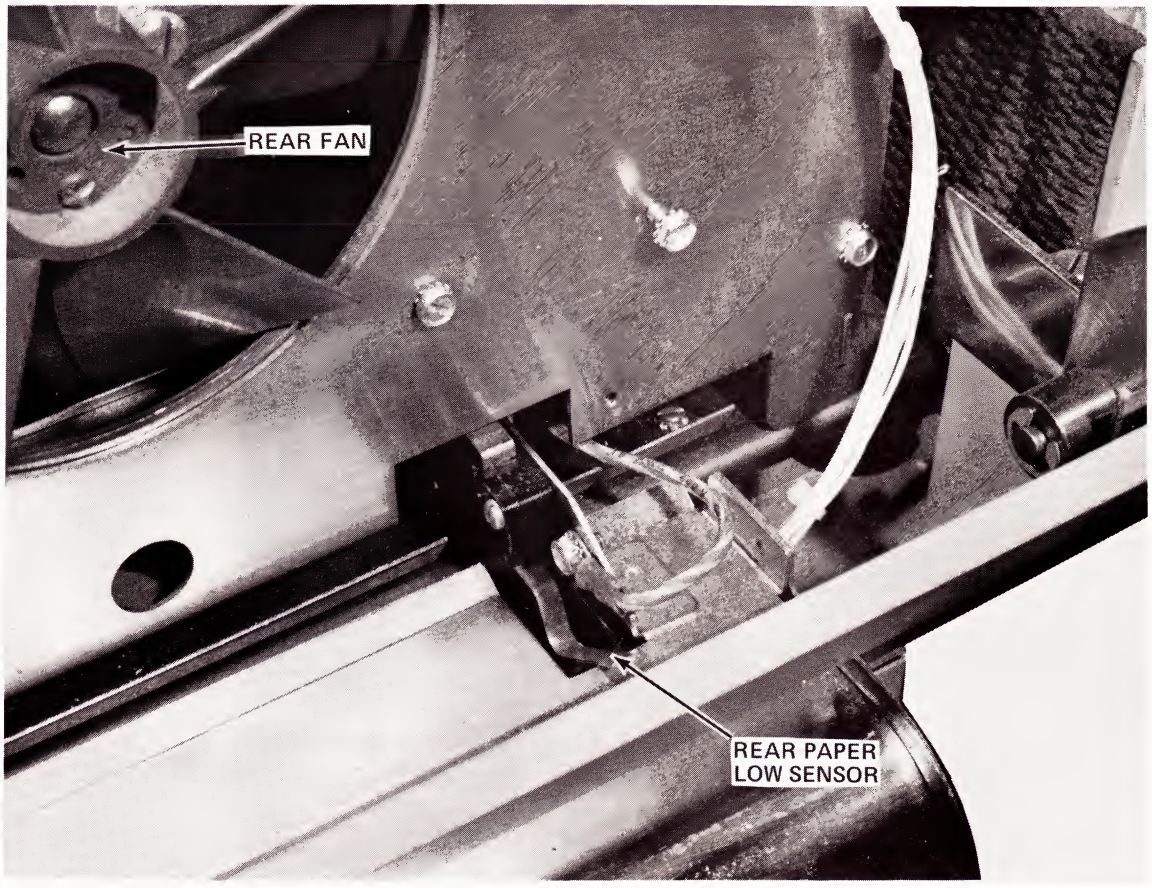


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Figure 5-22. Rear Paper Low Sensor

PAPER OUT SWITCH
(Figure 5-23)

1. Disconnect Corresponder from AC power source.
2. Open top cover.
3. Remove power supply cover.
4. Remove platen.
5. Remove cosmetic shield.
6. Remove the two switch mounting screws and two attached wires.
7. Attach wires to replacement switch and secure switch to mounting bracket with screws removed in previous step.
8. Replace cosmetic shield, platen, and power supply cover.
9. Check operation of switch.

NOTE

Switch adjustment will not normally be necessary. However, if adjustment is necessary, the switch arm can be carefully bent to obtain correct contact with the paper.

TOP COVER INTERLOCK SWITCH
(Figures 5-10 and 5-24)

1. Disconnect Corresponder from AC power source.
2. Remove top cover.
3. Remove fan duct.
4. Using a pencil, place a mark on switch mounting bracket adjacent to bottom edge of each mounting tab on switch housing.

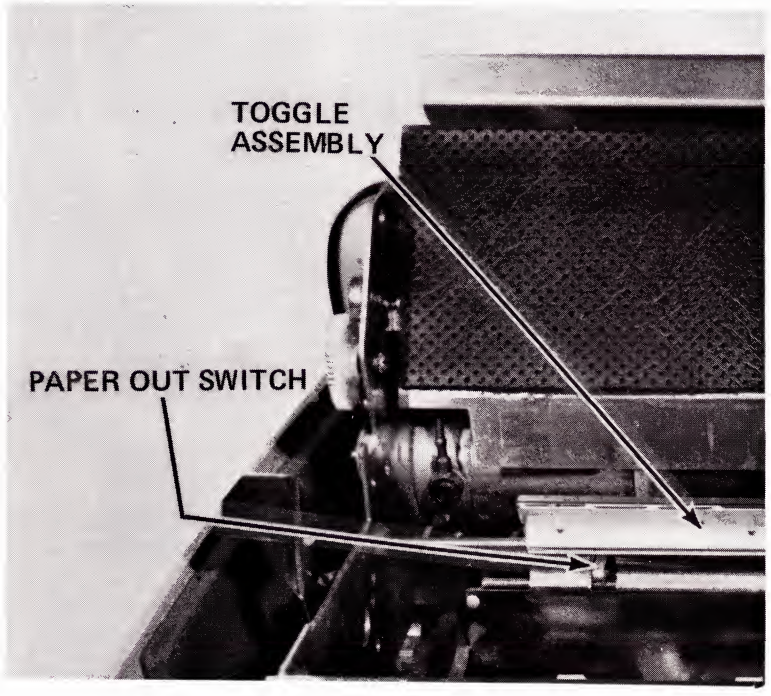

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Figure 5-23. Paper Out Switch Location

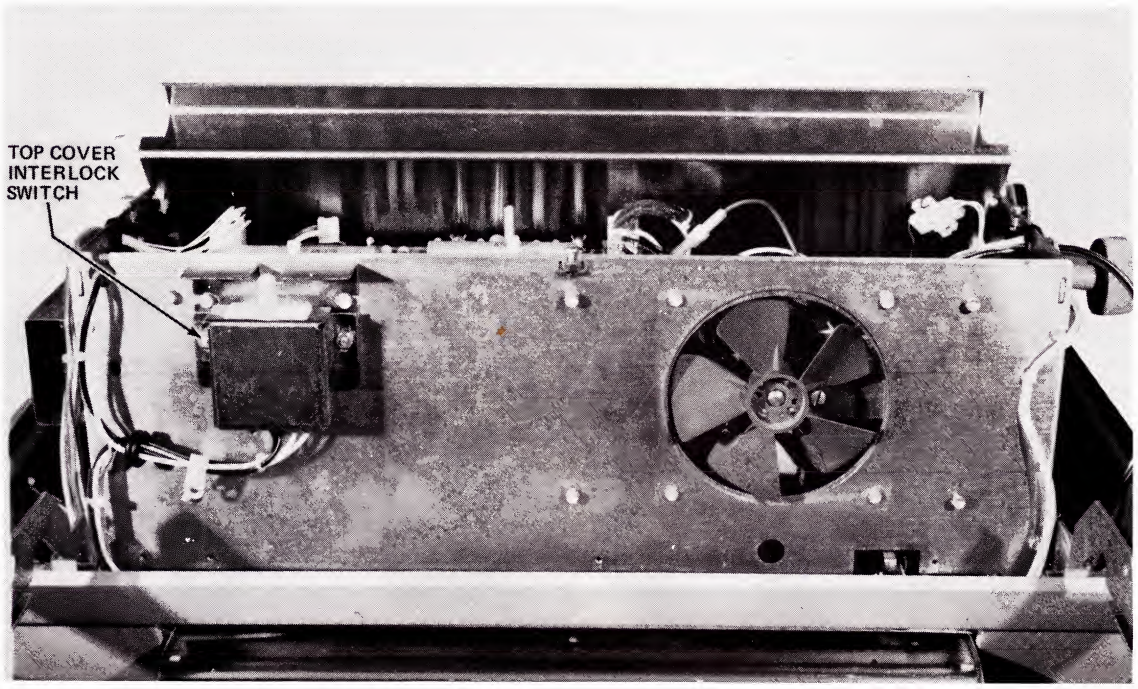

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Figure 5-24. Top Cover Interlock Switch

5. Remove the two mounting nuts securing switch housing to mounting bracket.

6. Turn switch housing around exposing switch and remove the two black and two white wires from switch terminals (see Figure 5-25).

7. Squeeze the two plastic tabs together on sides of switch and pull switch up through top of switch housing.

8. Orient replacement switch with identifying marks on switch body facing out. Push switch into opening at top of switch housing until it snaps securely in place. Holding housing so that switch is exposed, connect the two white leads onto the outer two terminals at right end of switch. Connect the two black leads to the outer two terminals at left end of switch.

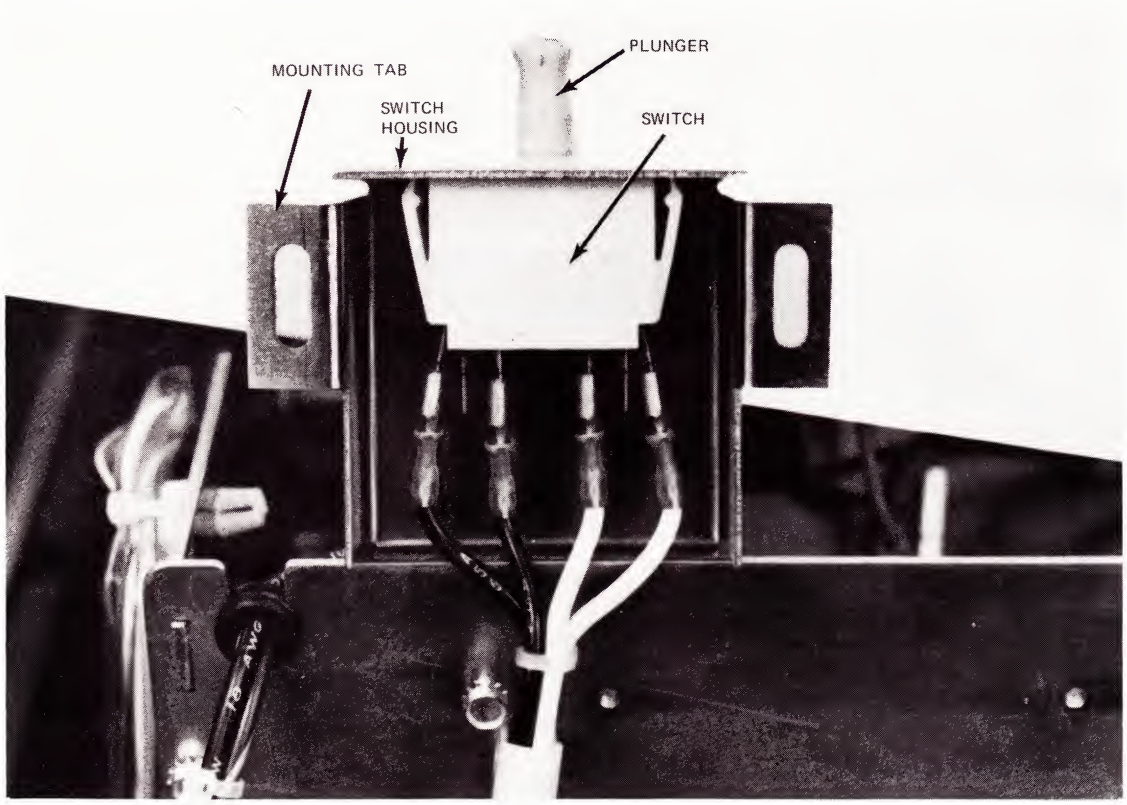
9. Turn switch housing around and place in position against mounting bracket.

10. Insert the two mounting screws previously removed and snug screws up finger tight.

11. Adjust switch assembly by lining up bottom edges of mounting tabs with pencil marks made from step 4 above.

12. Tighten both mounting screws.

13. Connect Corresponder to AC power source and check operation of switch by closing and opening top cover with Corresponder turned on. Corresponder motor should turn off when cover is raised ¾ - 1 in. (19.1-25.4 mm). Adjust switch position if necessary. The interlock switch can be defeated (by a qualified serviceman only) while the top cover is open by pulling up on the switch plunger.



PLH-6091

Figure 5-25. Top Cover Interlock Switch Connections

POWER SUPPLY (XPS) BOARD (Figure 5-26)

1. Disconnect Corresponder from AC power source.
2. Raise top cover.
3. Remove cosmetic shield.
4. Loosen the three power supply cover screws and slide cover off.
5. Remove all connectors from the XPS board.
6. Take out five hex head mounting screws and remove board.
7. Replace XPS by reversing steps 4, 5, and 6.

WARNING

DO NOT TURN POWER ON WITHOUT POWER SUPPLY COVER IN PLACE.

8. Turn power on and check Corresponder operation.
9. Replace cosmetic shield and lower top cover.

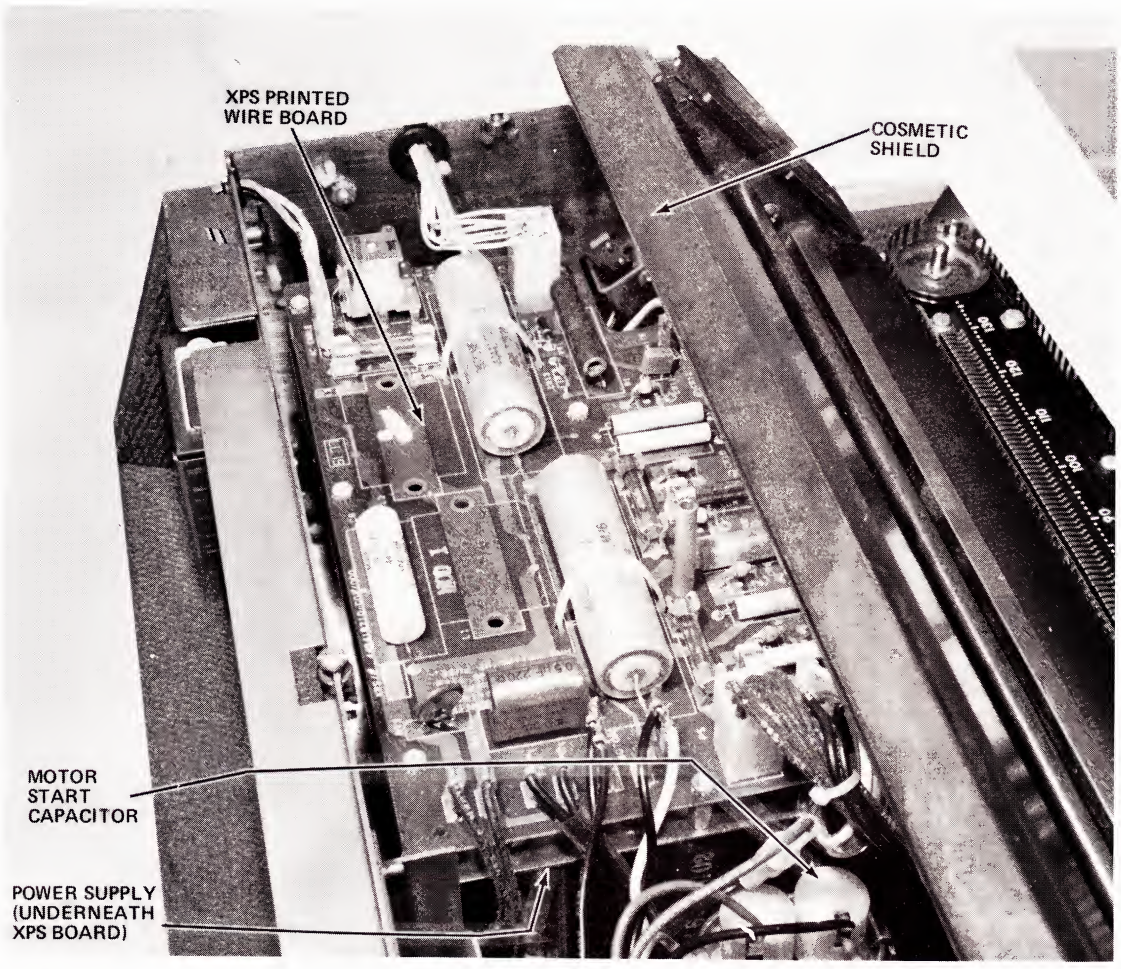


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Figure 5-26. XPS Board Location

COOLING FANS (Figure 5-27)

When replacing any cooling fan, it is particularly important that the replacement fan be oriented to achieve the correct air flow through the Corresponder as illustrated in Figure 5-27.

FRONT COOLING FAN (Figure 5-28)

1. Raise top cover.
2. Remove control panel.
3. Disconnect in-line connector.
4. Remove four fan mounting screws and washers, and remove fan.

CAUTION

When replacing fan, orient fan so that direction of air flow is toward inside of Corresponder.

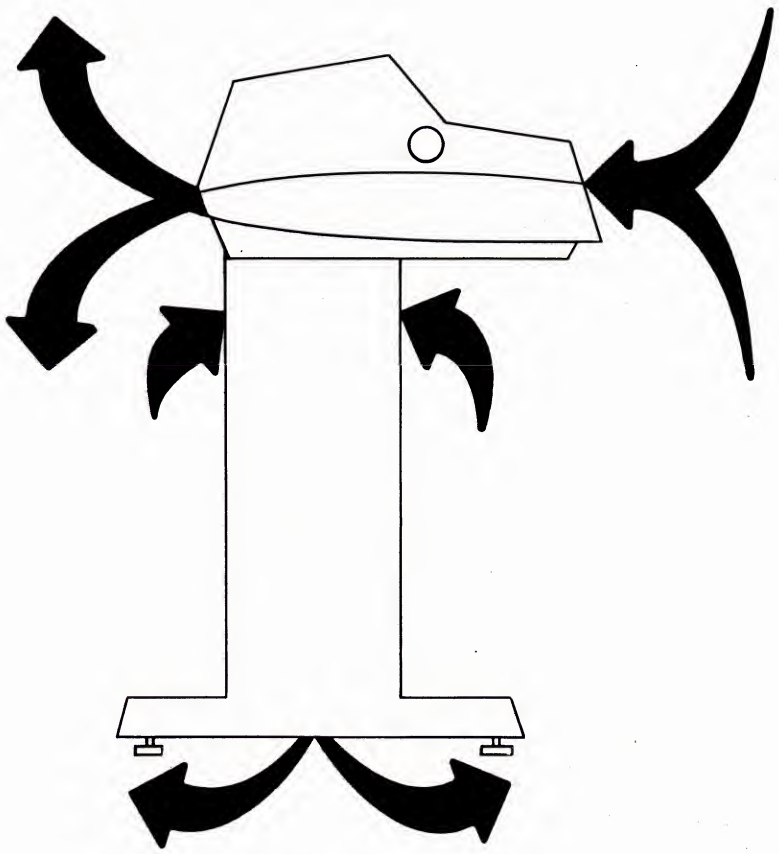

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Figure 5-27. Correct Cooling Air Flow

5. Secure fan with hardware previously removed.

6. Connect in-line connector and make sure fan wires are dressed away from fan blade.

7. Connect control panel cable and set control panel in place, but do not replace control panel hardware until later.

8. Use top cover interlock switch to turn power on. Turn Corresponder on, and check operation of fan.

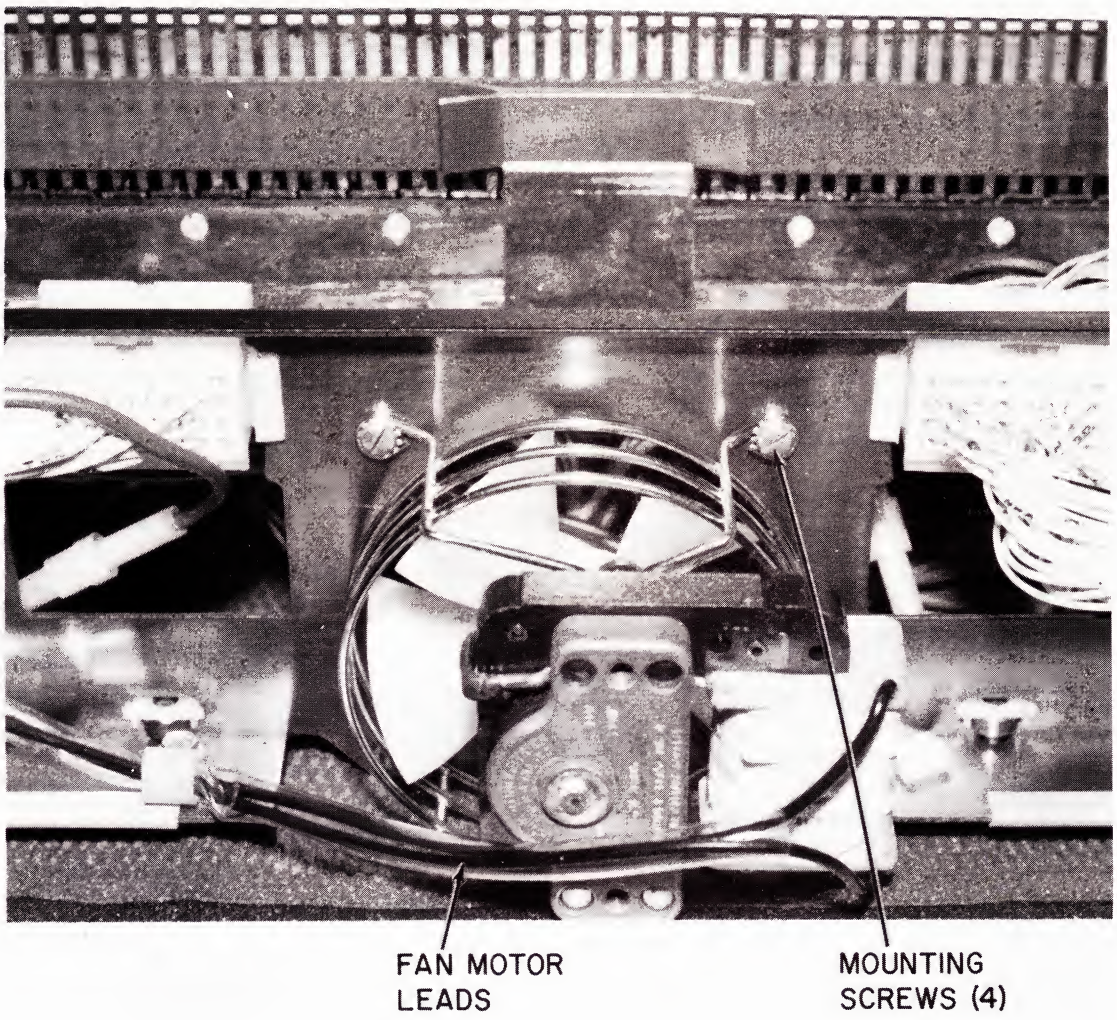
9. Turn power off with top cover interlock switch.

10. Replace control panel hardware previously removed.

REAR COOLING FAN
(Figure 5-22)

CAUTION

Do not use A44B500706-G01 replacement fan assembly on printers operating on 50 Hz input power. Use replacement fan assembly 44A417868-001 or 44B500708-G02 only for 50 Hz operation. Any one of the above three fan assemblies can be used for 60 Hz operation, however.



PLH-7028

Figure 5-28. Front Cooling Fan

1. Disconnect Corresponder from AC power source.
2. Raise top cover.
3. Remove power supply cover.
4. Remove fan leads from XPS board.
5. Remove the four screws, nuts and washers securing fan to rear frame, and remove fan.

CAUTION

When replacing fan, orient fan so that direction of air flow is toward outside of Corresponder.

6. Replace hardware previously removed to secure replacement fan.
7. Connect fan leads to XPS board.
8. Replace power supply cover and check operation of fan.

BOTTOM COOLING FAN (Figure 5-29)

1. Turn power on.
2. Remove front and rear pedestal covers.
3. Remove all bustle boards.

4. Remove bustle assembly from pedestal.

5. Disconnect the two motor leads from the motor.

6. To remove the cooling fan from the bustle, remove the four nuts, star washers, and flat washers from the four hex head mounting screws.

CAUTION

When installing the replacement fan, make sure it is oriented to force air out at the bottom of the pedestal.

7. Reverse steps 3 through 6 above.

8. Turn power on and check operation of fan. Verify that air is being exhausted from bottom of pedestal.

9. Replace pedestal cover.

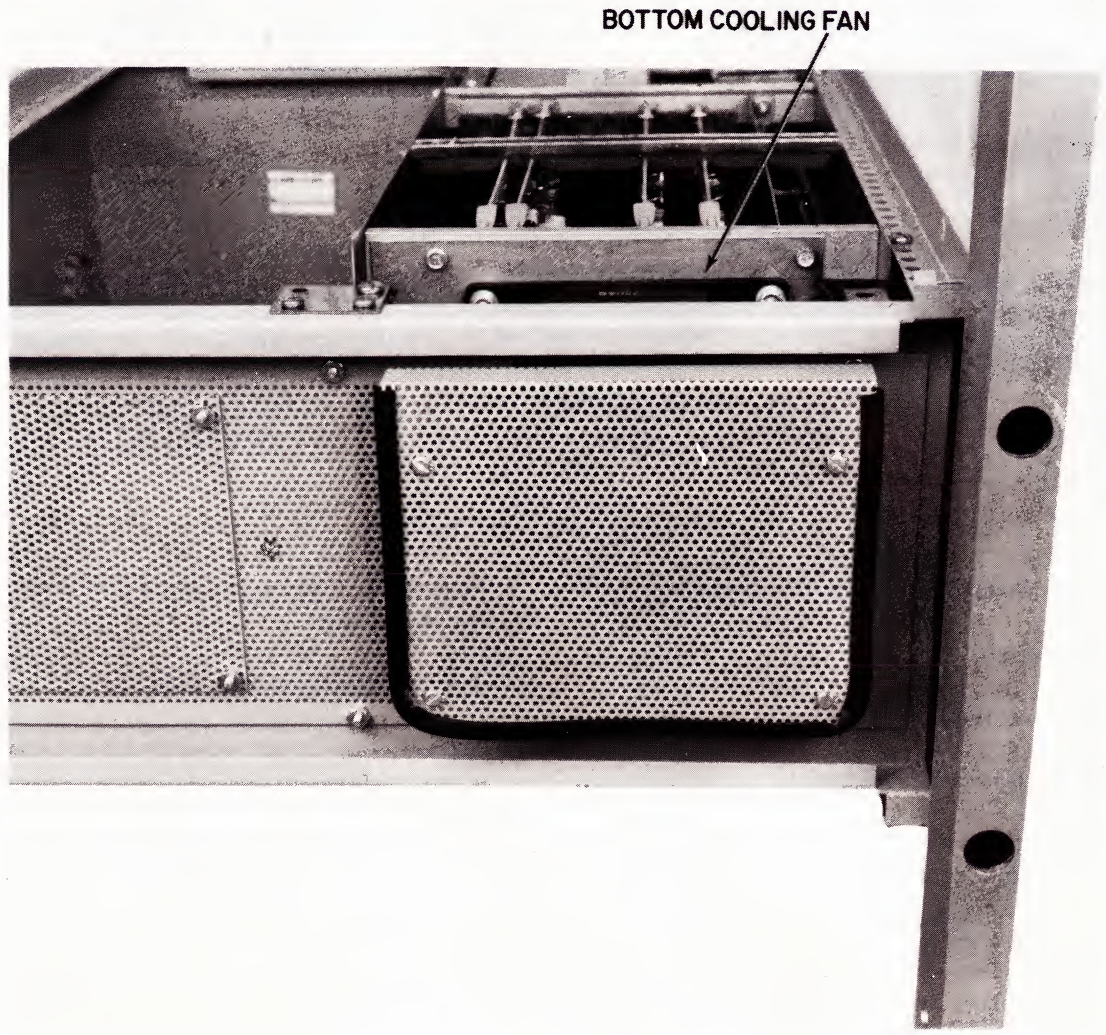


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Figure 5-29. Bottom Cooling Fan

LINEFEED SERVO MOTOR (Figure 5-30)

1. Open top cover.
2. Disconnect the AC power source.
3. Slide the drive belt off the linefeed servo motor pulley.
4. Remove the power supply cover.
5. Remove the cosmetic shield.
6. Disconnect inline connectors to motor and servo encoder.
7. Remove four hex screws and washers from support collar on outside of side frame.
8. Slide servo motor out of Corresponder.
9. Replace the servo motor by reversing the above steps.
10. Using the screws in Step 7, adjust the drive belt for .065-.105 in. (1.65-2.67 mm) deflection with 4 oz. (114 g) of applied pressure at the mid-span of the belt at the tightest point.

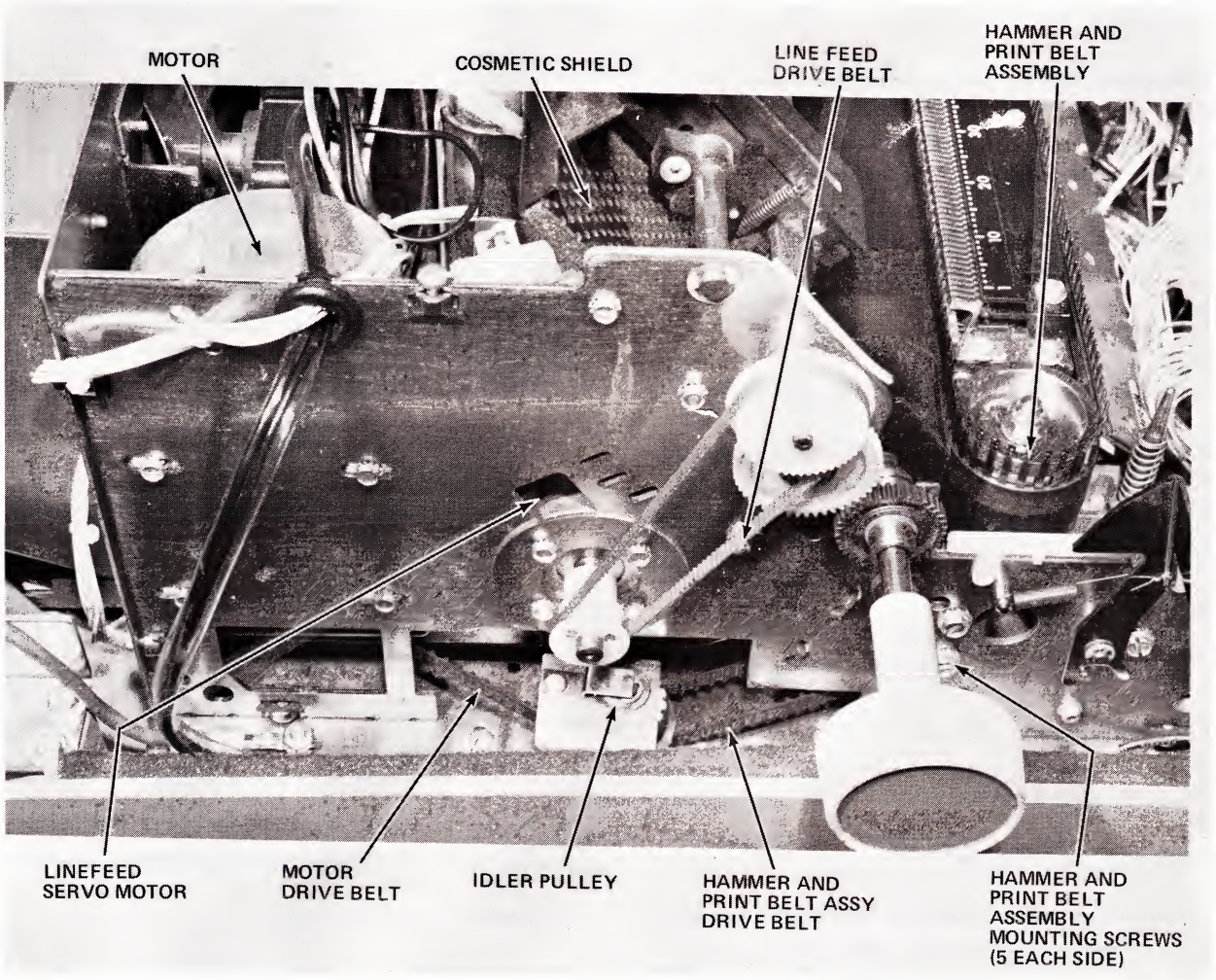

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Figure 5-30. Corresponder Left Rear Side

IDLER PULLEY DRIVE BELTS
(Figure 5-30)

1. Raise top cover.
2. Loosen and remove two idler pulley bracket screws.
3. Loosen and remove the two screws holding the access plate under the left front of Corresponder. Remove the plate.
4. Reach up through access hole and slip belt off the pulley under hammer and print belt assembly.
5. Reach through the access hole in the rear of the left side and remove the drive belt from the motor pulley.
6. Remove the drive belt from the idler pulley by:
   a. Loosen the top bearing retaining screw and swing the retainer out of the way.
   b. Pull shaft and E ring straight up and out of bearing. Pulleys should be free.
   c. Remove drive belt.
7. Replace the drive belts by reversing step 1 - 6.
8. Adjust both belt tensions by moving idler gear to obtain a 0.130 - 0.190 (3.3 - 4.8 g) deflection with 4 oz. (114 g) of applied pressure on each belt mid-span.

MOTOR
(Figure 5-30)

1. Raise top cover.
2. Disconnect AC power.
3. Remove power supply cover.
4. Disconnect white lead from XPS board, red lead from start capacitor rear terminal, and yellow lead from start capacitor front terminal.
5. While holding motor, remove four hex head screws and star washers from left side of frame.
6. Lift motor up, tip as necessary to remove drive belt from motor pulley.
7. Replace motor by reversing the above steps.

VCP BOARD AND MOUNTING BRACKET
(Figure 5-8)

1. Raise top cover of the Corresponder.
2. Remove the two VCP connector screws and remove the connector.
3. Remove two screws, washers, and nuts holding VCP mounting bracket and remove the bracket.
4. Remove the three screws, star washers, spacers, and hex nuts that hold the VCP board to the bracket. Slide VCP board out of the bracket.
5. Replace VCP board and bracket by reversing the above steps.

REBOUND BELT
(Figure 5-31)

1. Open top cover.
2. Remove ribbon cartridge.
3. Grasp rebound belt near either print belt pulley and remove belt.
4. Replace rebound belt by working rib side of belt into groove in rebound bar, and stretching belt around print belt pulleys making sure belt rib is in pulley grooves. Visually inspect belt installation to make sure belt is not wrapped around any of the print fingers.
5. Rotate print belt counterclockwise a few revolutions to make sure rebound belt is correctly seated.
6. Replace ribbon cartridge.
7. Close top cover.

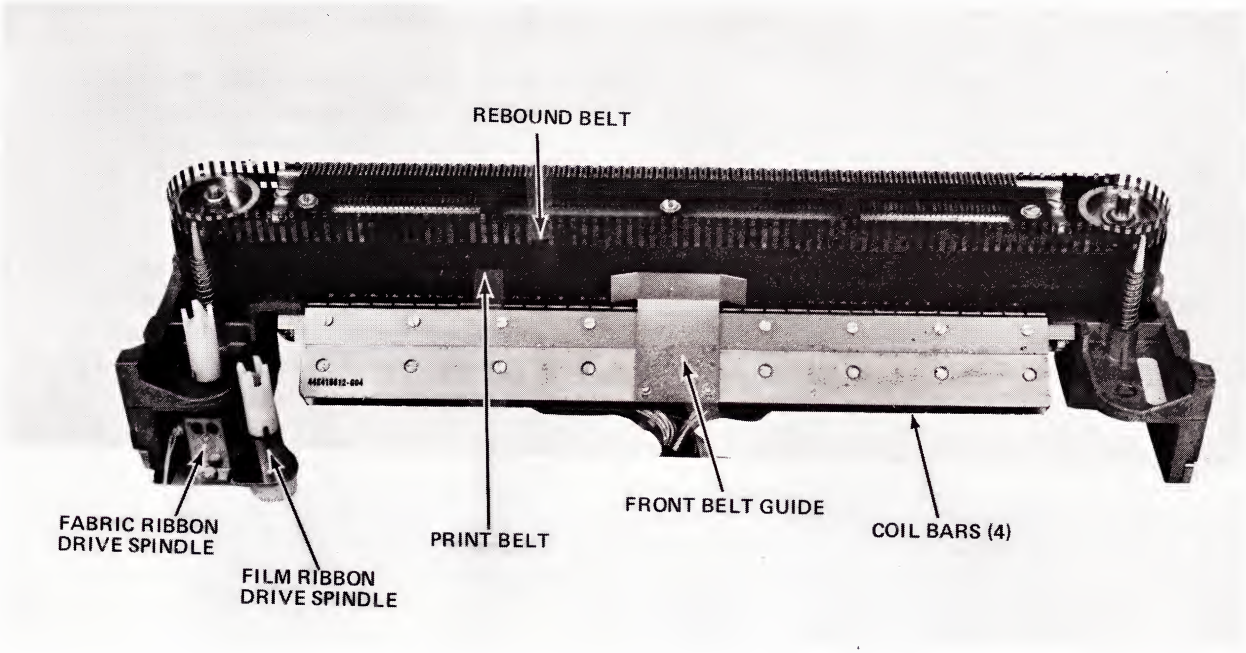

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Figure 5-31. Hammer and Print Belt Assembly (Front View)

PRINT BELT REPLACEMENT (Figure 5-32)

1. Open top cover.
2. Remove ribbon cartridge.
3. Remove rebound belt.
4. Insert a 10-32 x 1½ to 2 inch screw into the threaded hole inside of tension support casting. Turn screw in until it moves tension arm assembly to its extreme left end of travel. This will take all tension off the print belt making its removal much easier.
5. Work the print belt up over both print belt pulleys until it is free.

CAUTION

Exercise caution during the following step to ensure that the lower ends of the print fingers do not get between the dust shield and the aperture in front of the photocell. Failure to observe this precaution may result in damage to the photocell assembly.

6. Replace print belt by reversing steps 3, 4, and 5 above.

CAUTION

Make sure bottoms of print fingers are in slot in photocell assembly.

7. Rotate print belt counterclockwise a few revolutions to make sure there is no interference with the print fingers.

8. Replace ribbon cartridge.

9. Close top cover.

PRINT FINGER
(Figure 5-33)

1. Open top cover.

2. Remove ribbon cartridge.

3. Rotate print belt counterclockwise until damaged finger is just moving off the left print belt pulley toward front of Corresponder.

NOTE

The reference fingers (one for each font in the print belt) with wide bottoms, also referred to as font fingers, can be removed by following the Font Tab Finger Replacement procedure.

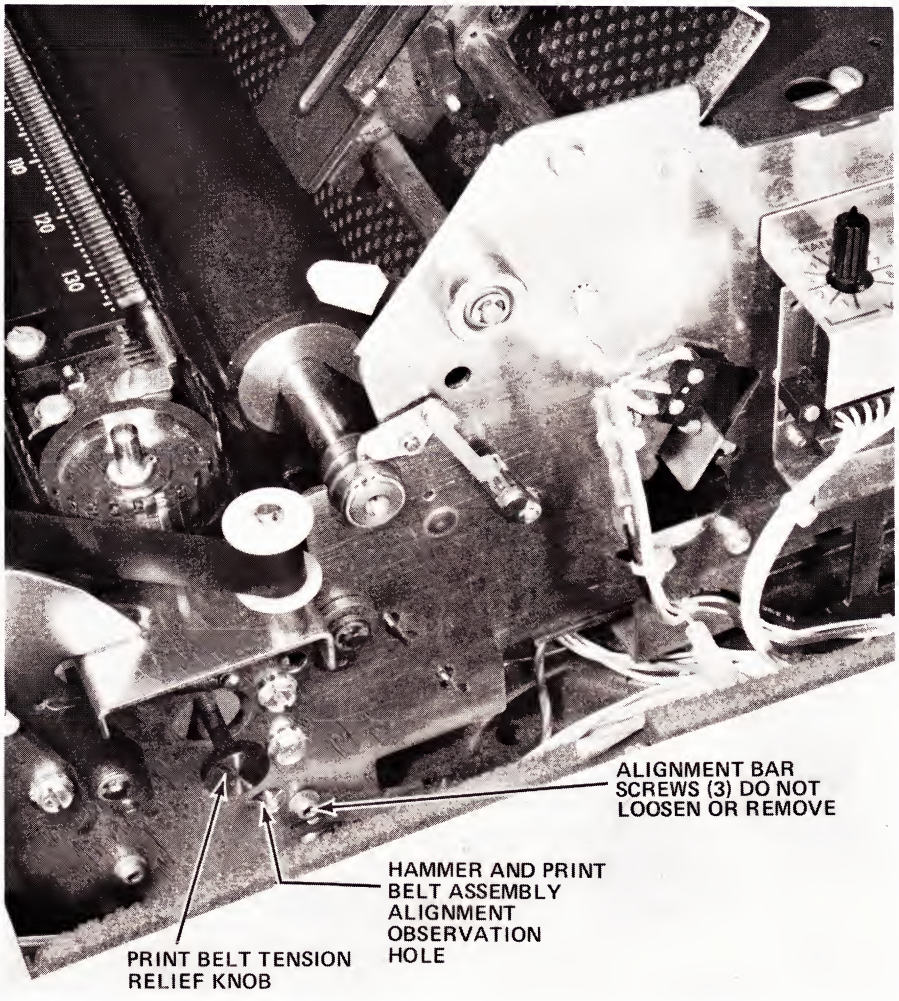

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Figure 5-32. Corresponder Main Frame (Right Side)

4. Grasp finger firmly (close to belt) with finger removal pliers and pull straight up and out of belt.

5. Grasp replacement finger as far down as possible and insert it into appropriate belt slot. Push replacement finger in approximately a quarter of an inch at a time. Take care not to bend finger.

6. Push finger down until wide flange is firmly seated against belt.

7. Check alignment on top of replacement finger in relation to other fingers in belt. If out of line, carefully bend finger to conform with other fingers.

8. Make sure all fingers are touching rebound belt.

FONT TAB FINGER REPLACEMENT

Font tab fingers are similar to all of the other print fingers with the exception that they have a tab welded on the bottom (see Figure 5-34). These fingers may be replaced only by the single ear type as illustrated in Figure 5-34.

1. Remove print belt.

2. Break welded-on font reset tab off bottom of finger.

3. Smooth off any sharp edges or burrs on bottom of finger.

4. Pull finger up, out of belt from top side of belt.

5. Making sure the replacement finger is of the single ear type, insert replacement finger, character end first, into bottom side of belt. Push finger up through belt until single ear on finger is above top of belt.

6. Check that finger character is same as on other font tab fingers on belt, and that it is facing outside of belt.

7. Reinstall print belt in Corresponder.

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Figure 5-33. Print Finger Replacement

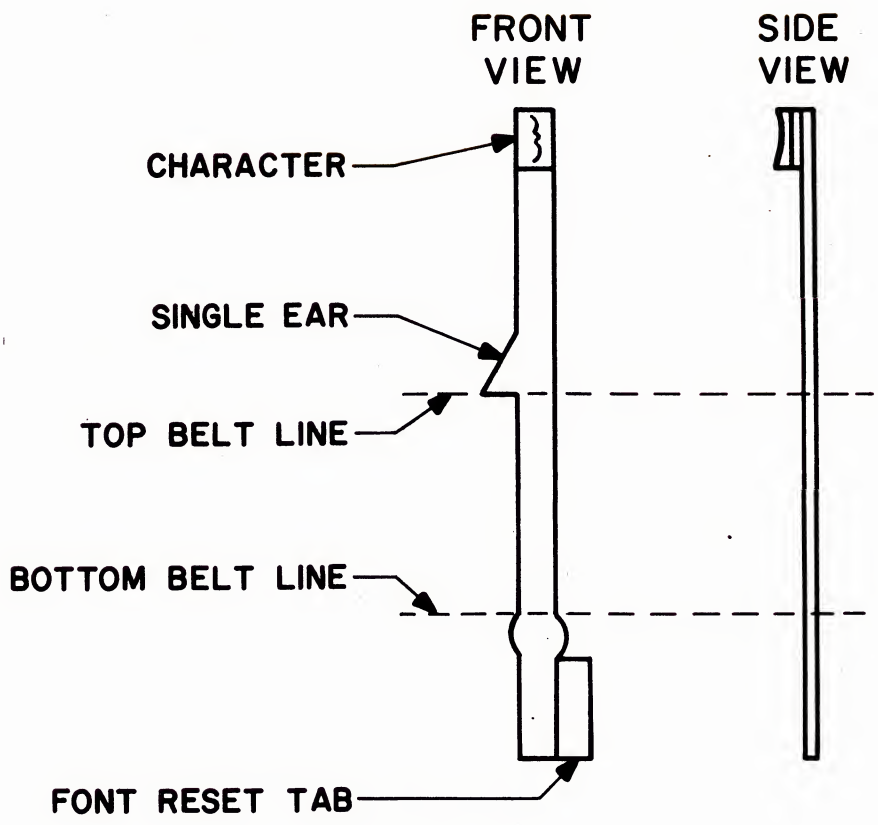

Figure 5-34. Font Tab Finger Detail

HAMMER AND PRINT BELT ASSEMBLY (Figures 5-30 and 5-32)

1. Raise top cover.

2. Remove ribbon cartridge.

3. Remove the five mounting screws from side frame on each end of hammer and print belt assembly.

CAUTION

Do not loosen the three smaller screws securing alignment bars to side frames. The adjustment of alignment bars is critical and can only be done at the factory.

4. Disconnect the four large connectors in front main frame. If special connector removal tool is not available, connectors can be loosened using only a screwdriver as follows:

   a. Release connector lock by prying up on small tab located in top center of inside portion of connector.

   b. Rest the screwdriver shank on top of front main frame with tip against lip on inside portion of connector. Gently tap along connector lip until the connector halves begin to separate, then pull connector apart (see Figure 5-35).

5. Disconnect the four single hammerbank conductors — two black and two red.

6. Disconnect photocell cable. The connector is located in left, front main frame.

7. Disconnect the ribbon magnetic clutch connector.

8. Remove access hole cover under left, front of Corresponder and slip left drive belt off pulley under hammer and print belt assembly.

9. Lift hammer and print belt assembly straight up out of main frame.

CAUTION

When lifting the hammer and print belt assembly out of the Corresponder, ensure there are no wires hooked or snagged around the ribbon sensing jack.

10. Before replacing hammer and print belt assembly, make sure toggle assembly is in upright position with small arm making contact with arm on RUN/LOAD lever.

11. Lower hammer and print belt assembly down into main frame until alignment bars on assembly are resting firmly against alignment bars on side frame.

12. Insert five mounting screws previously removed through side frames into each end of hammer and print belt assembly. Turn screws in, but, leave them loose.

13. Check mating of alignment bars on both sides through observation holes in side frames. (See Figure 5-32.) If bars are not flat against each other, grasp each bottom, front corner of Corresponder and gently twist main frame by alternately lifting up on each corner. While doing this, observe alignment bars. When bars are correctly mated together, tighten the five mounting screws on each side of main frame.

NOTE

Frame will remain in desired position (alignment bars perfectly mated together) if the four screws securing bottom of Corresponder to top of pedestal are loosened and a screwdriver is used as a temporary shim between Corresponder and pedestal. The technique is to observe the side of the Corresponder where a gap exists between alignment bars and insert a screwdriver between bottom of Corresponder enclosure and top of pedestal on that side. Push the screwdriver in until the gap disappears. Check alignment bars on other side of Corresponder to make sure they are correctly mated, and tighten the five mounting screws on each side of main frame. Remove screwdriver and tighten four screws securing Corresponder to pedestal.

14. Slip drive belt over left pulley under hammer and print belt assembly by reaching up through access hole under left, front of Corresponder.

15. Rejoin large hammerbank connectors. Check connector labels to assure correct mating of connectors.

NOTE

Hammerbank connectors are keyed to prevent erroneous connections. The connectors also have identifying labels attached to their top and bottom side.

16. Rejoin hammerbank single connectors, photocell connector and ribbon magnetic clutch connector.

CAUTION

Make sure cooling fan wires are dressed away from front cooling fan.

17. Replace ribbon cartridge and check operation.

18. Replace cover over access hole under left, front of Corresponder.

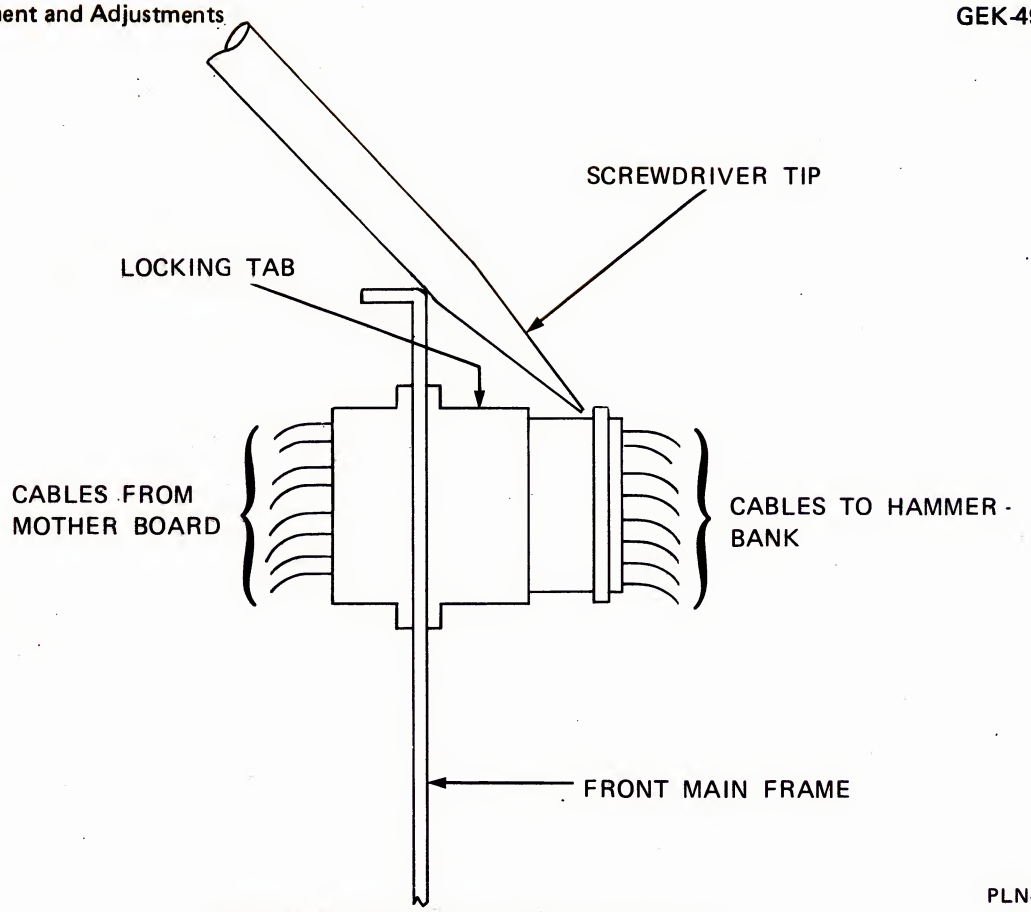

Figure 5-35. Hammerbank Connector Removal

HORIZONTAL SCALE

If the Corresponder is equipped with a horizontal scale, it can be removed with the two screws illustrated in Figure 5-36.

Adjustment of the scale is possible by loosening the mounting screws and sliding the scale left or right until the marks line up with the corresponding hammers.

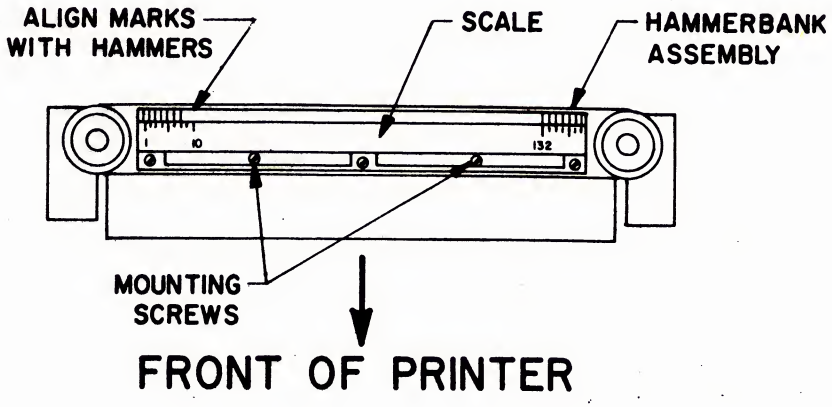

Figure 5-36. Horizontal Scale

PAPER HOLDER
(Figure 5-37)

1. Open top cover.
2. Remove ribbon cartridge.
3. Remove hammer and print belt assembly.
4. Remove the six small screws and washers securing paper holder to belt guide. DO NOT loosen larger belt guide screws as this will destroy belt guide adjustment.
5. Replace paper holder using the six screws and washers previously removed.
6. Replace hammer and print belt assembly in Corresponder.
7. Replace ribbon cartridge.
8. Close top cover, and check operation.

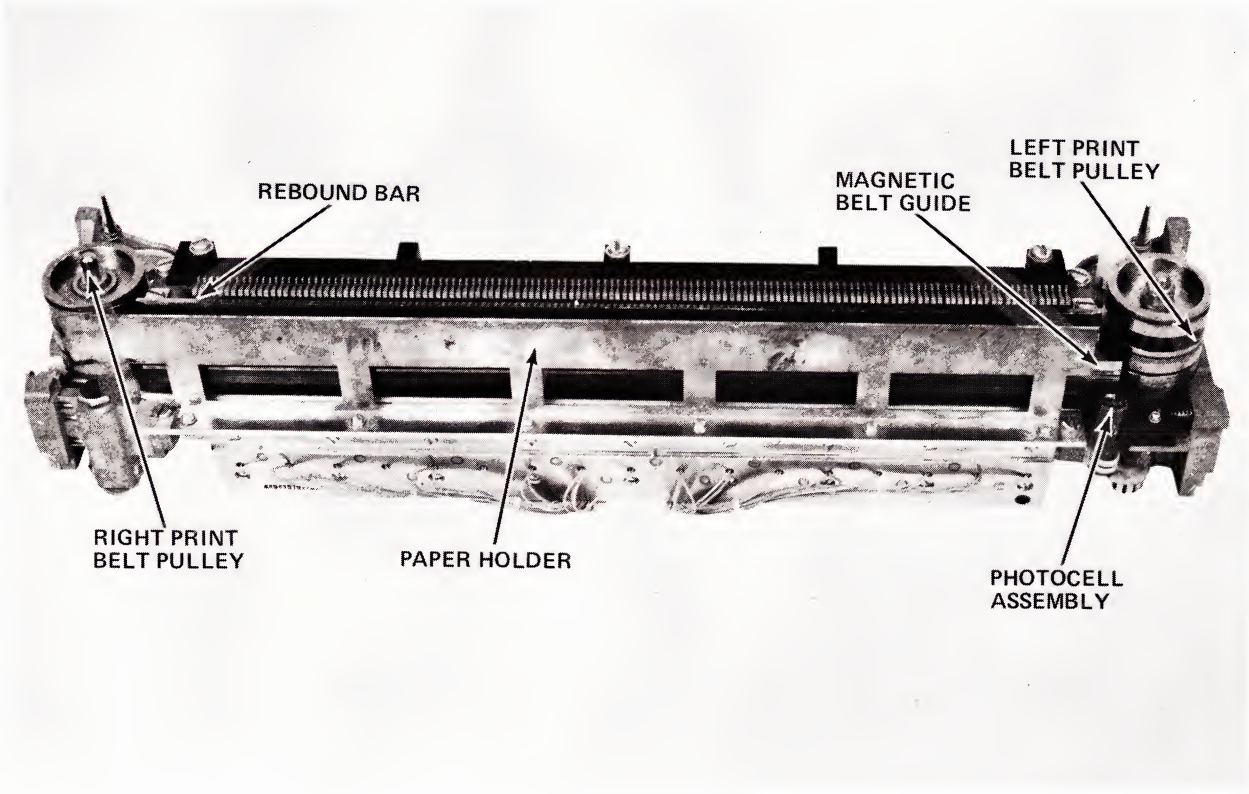

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Figure 5-37. Hammer and Print Belt Assembly (Rear View)

VERTICAL ADJUSTMENT OF MAGNETIC BELT GUIDE (Figures 5-37 and 5-38)

In the unlikely event that light printing would occur at either the upper or lower portions of printed characters, after changing a print belt, the following procedure should be followed for adjusting the magnetic belt guide.

1. Open top cover.
2. Remove ribbon cartridge.
3. Remove hammer and print belt assembly.
4. Remove rebound belt and print belt.
5. Remove the large slotted screw on either end of the magnetic belt guide.
6. Lift up belt guide taking care not to misplace any of the shims located underneath.
7. To compensate for light printing, belt guide should be raised or lowered as follows:

   a. When light printing at tops of characters occurs — lower belt guide.

   b. When light printing at bottoms of characters occurs — raise belt guide.

The print belt is raised or lowered by adding or removing shims as required. In most cases, the belt guide will not require more than 0.005 in. (0.13 mm) adjustment to correct any printing deficiency. Shims are available in 0.003 inch (0.08 mm), 0.005 inch (0.13 mm), 0.007 inch (0.18 mm), or 0.010 inch (0.25 mm) sizes.

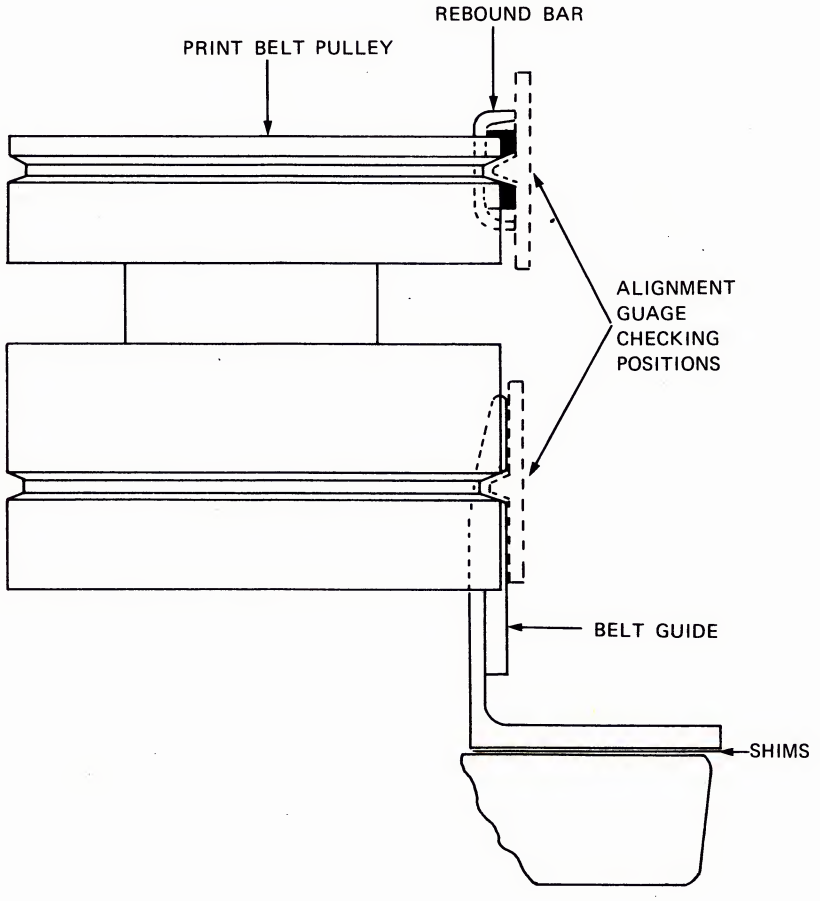

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Figure 5-38. Alignment of Magnetic Belt Guide and Rebound Bar With Print Belt Pulleys

NOTE

When shim sizes are not known, a micrometer must be used to determine thickness of shims.

8. After making shim change under ends of belt guide, replace the two belt guide mounting screws, but do not tighten them as belt guide must be adjusted horizontally (see procedure below).

9. Remove both print belt pulleys. Remove nut and loosen set screw to remove left pulley, and remove grip ring to remove right pulley.

10. Make the same shim adjustment under both print belt pulleys as was done under belt guide.

11. Replace both print belt pulleys.

12. Use an alignment gauge to check vertical alignment of print belt pulley grooves with rebound bar and magnetic belt guide (see Figure 5-38).

13. Make horizontal adjustment on belt guide (see procedure below).

14. Replace print belt and rebound belt.

15. Replace hammer and print belt assembly.

16. Check tracking of rebound belt. If rebound belt tends to ride out of grooves in either the print belt pulleys or rebound bar when the pulleys are rotated, check the horizontal adjustment on the belt guide.

CAUTION

Do not loosen any other screws on top of hammerbank as these will affect a critical factory adjustment.

NOTE

When installing the rebound bar, place so that center of bar touches hammerbank before ends.

17. Replace ribbon cartridge.

18. Install paper and check print quality.

HORIZONTAL ADJUSTMENT OF MAGNETIC BELT GUIDE (Figures 5-37 and 5-39)

1. Open top cover.

2. Remove ribbon cartridge.

3. Remove hammer and print belt assembly.

4. Insert a 10-32 x 1½ to 2 inch screw into the threaded hole inside of tension support casting. Turn screw in until it just makes contact with the tension arm assembly. This will hold right print belt pulley in its normal running position after print belt has been removed.

5. Remove rebound belt and print belt.

6. Loosen large slotted screw on either end of the belt guide.

7. Holding a straight edge against the right end of belt guide, move the belt guide until a clearance of 0.039 ± 0.003 inch (1.0 ± 0.08 mm) is obtained between outer surface of right print belt pulley and straight edge. Snug down right belt guide screw and repeat above procedure for left end of belt guide. When adjustment is complete, tighten down both belt guide screws and recheck clearance on each end.

8. Replace print belt and rebound belt.

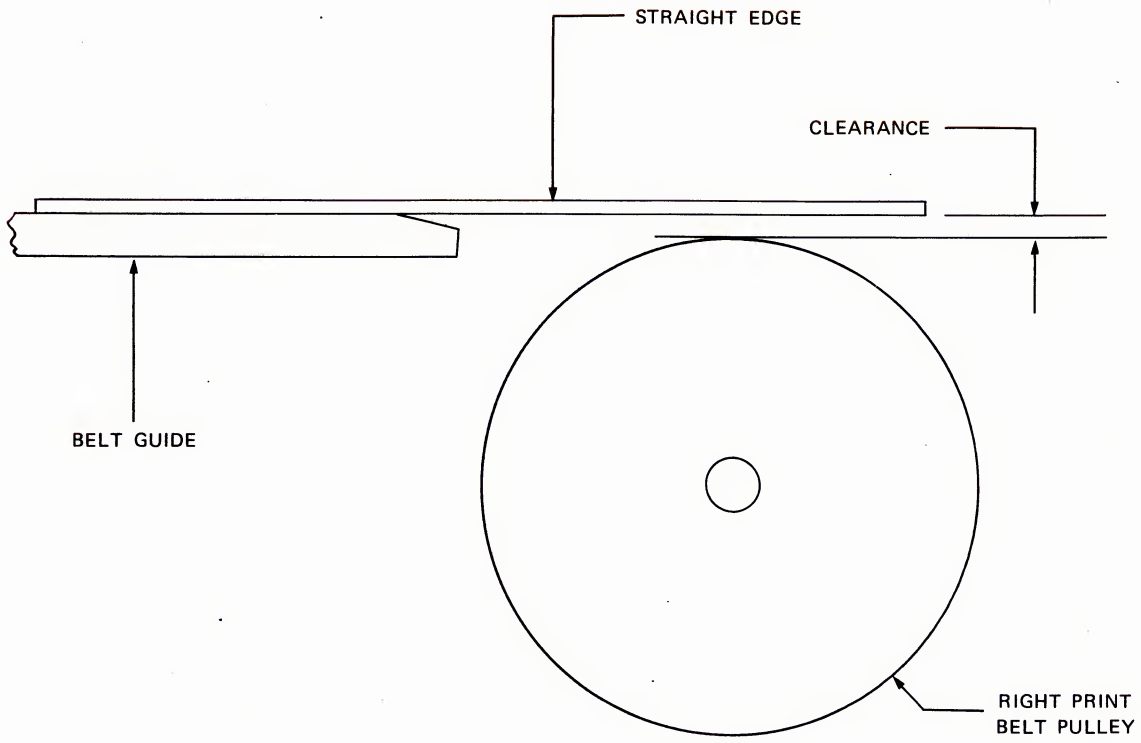
9. Remove 10-32 screw from side of tension support casting.

10. Rotate print belt counterclockwise a few revolutions and check for binding.

11. Replace hammer and print belt assembly.

12. Replace ribbon cartridge.

13. Close top cover.



PLH-6042

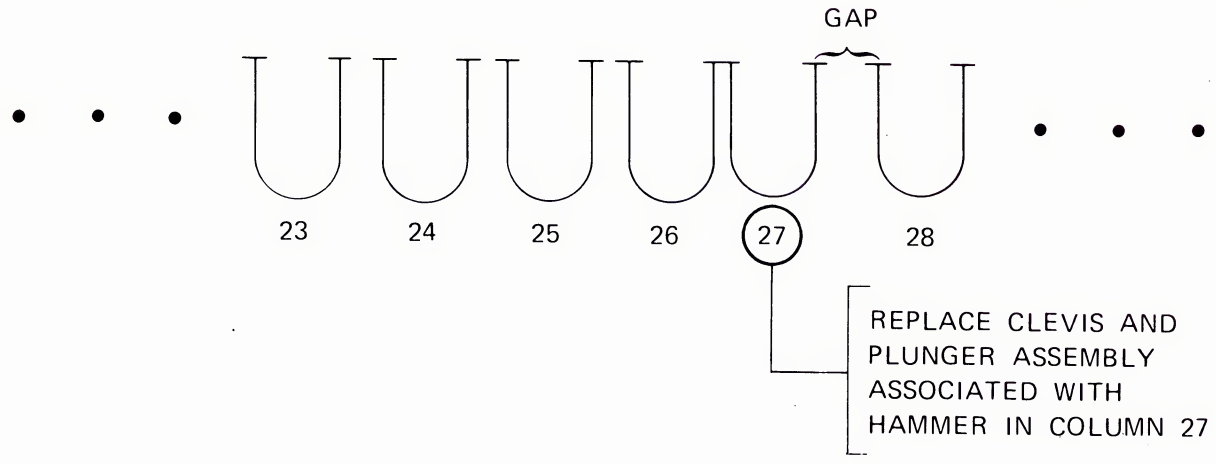
Figure 5-39. Magnetic Belt Guide Horizontal Adjustment

FRONT BELT GUIDE
(Figure 5-31)

1. Open top cover.
2. Remove ribbon cartridge.
3. Remove the two front guide mounting screws and remove guide.
4. When guide has been replaced, adjust for a clearance of 0.050-0.070 inch (1.3-1.8 mm) between guide and print belt.

CLEVIS AND PLUNGER ASSEMBLIES

The usual symptom associated with a clevis and plunger assembly requiring replacement will be gapping (abnormal spacing between characters) in the printed copy (see Figure 5-40). An excellent test to determine if gapping is occurring is to print a full line by repeating the character "U". If a pattern of gaps appears in the printed line, adjust Corresponder timing using the timing gage (see Photocell Adjustment), and repeat the test. If one or more gaps still appear in the printed copy, the clevis and plunger assembly associated with each gap should be replaced. Normally, the clevis and plunger assembly associated with the hammer which printed the character just left of the gap will be the one needing replacement. The procedure for replacing a clevis and plunger assembly is outlined on following page.



PLH-6127

Figure 5-40. Portion of Printout Showing Example of Gapping

1. Open top cover.

2. Remove ribbon cartridge.

3. Remove platen.

4. Insert a 10-32 x 1½ to 2 inch screw into the threaded hole in the side of tension support casting. Turn screw in until it just begins to make contact with tension arm. This will hold right pulley in its normal running position which will be necessary in later adjustments.

5. Remove rebound belt, print belt, and horizontal scale.

6. Remove the two screws from each end of rebound bar.

   Push down on center portion of rebound bar enough to disengage it from the two small brackets, and remove rebound bar.

7. Remove toggle assembly.

8. Remove the screw from each end of the rear belt guide and remove belt guide (refer to Figure 5-41).

   Carefully remove shims from under each end of belt guide taking care not to lose or mix shims from one side to the other.

   NOTE

   When replacing clevis and plunger assemblies for hammers in column positions 60 to 80, better access to the plunger can be gained by removing the front belt guide also.

9. Locate the hammer associated with affected clevis and plunger assembly, and push hammer with finger toward platen as far as necessary for clevis to clear hammer hook. While holding hammer in this position, slip clevis off hook on bottom of hammer, and let hammer return to its rest position (see Figure 5-41).

10. Grasp loose end of clevis and twist it so as to rotate plunger approximately 45°, and remove assembly by pulling plunger out of core.

11. Insert replacement clevis and plunger by reversing steps 9 and 10 above.

12. Check hammer throw with replacement clevis and plunger by pressing the plunger downward as far as possible and holding it while also pressing down on plunger for an adjacent hammer. If replacement clevis and plunger causes hammer throw to be equal to or slightly greater than adjacent hammer throw, replacement clevis and plunger should be satisfactory. However, if hammer throw with replacement clevis and plunger is less than adjacent hammer throw, previously installed clevis and plunger should be replaced by another assembly. Replacement of the clevis and plunger assembly should continue until hammer throw is as stated above.

NOTE

With hammer in rest position, check to see if hammer is resting against backstop bar. If not, bend slotted bracket over plunger up slightly to allow hammer to rest against bar.

13. Apply DAG #200 lubricant* sparingly to upper clevis pin on replacement clevis (see Figure 5-41). Also, inspect all other upper clevis pins for evidence of lubricant. If these areas are dry or show evidence of wear or rust, lubricate very sparingly with above lubricant. Only a trace of lubricant should be applied such that there is no chance of lubricant flowing down the clevis into the coil.

NOTE

A suggested technique for applying the lubricant is to pour a few drops out of the container onto a piece of paper, dip one end of a pipe cleaner into the lubricant on the paper, and lightly coat the clevis pins using the pipe cleaner.

14. Reinstall rear belt guide making sure all shims removed in step 8 are in place. Adjust rear belt guide per specifications stated in Table 5-1.

15. If removed earlier, replace and adjust front belt guide.

16. Replace toggle assembly.

17. Replace rebound bar. Make sure rebound bar is attached at center portion to the two clips provided by pushing up on bar.

18. Turn screw (inserted in step 4) all the way in to position right pulley in extreme left position. This will simplify installation of the print belt and rebound belt.

19. Install print belt, rebound belt, and horizontal scale. Remove screw inserted in step 4.

20. Install platen and ribbon cartridge.

HAMMER RETURN SPRING

1. Raise top cover, remove ribbon cartridge, and remove hammer and print belt assembly. Insert a 10-32 screw approximately 1½ or 2 inches in length into threaded hole in tension support casting. Turn screw in until it just makes contact with tension arm. This will hold the right pulley in its normal running position which will be necessary for later adjustments.

2. Remove print belt, rebound belt, and horizontal scale.

3. Remove the two screws from each end of rebound bar.

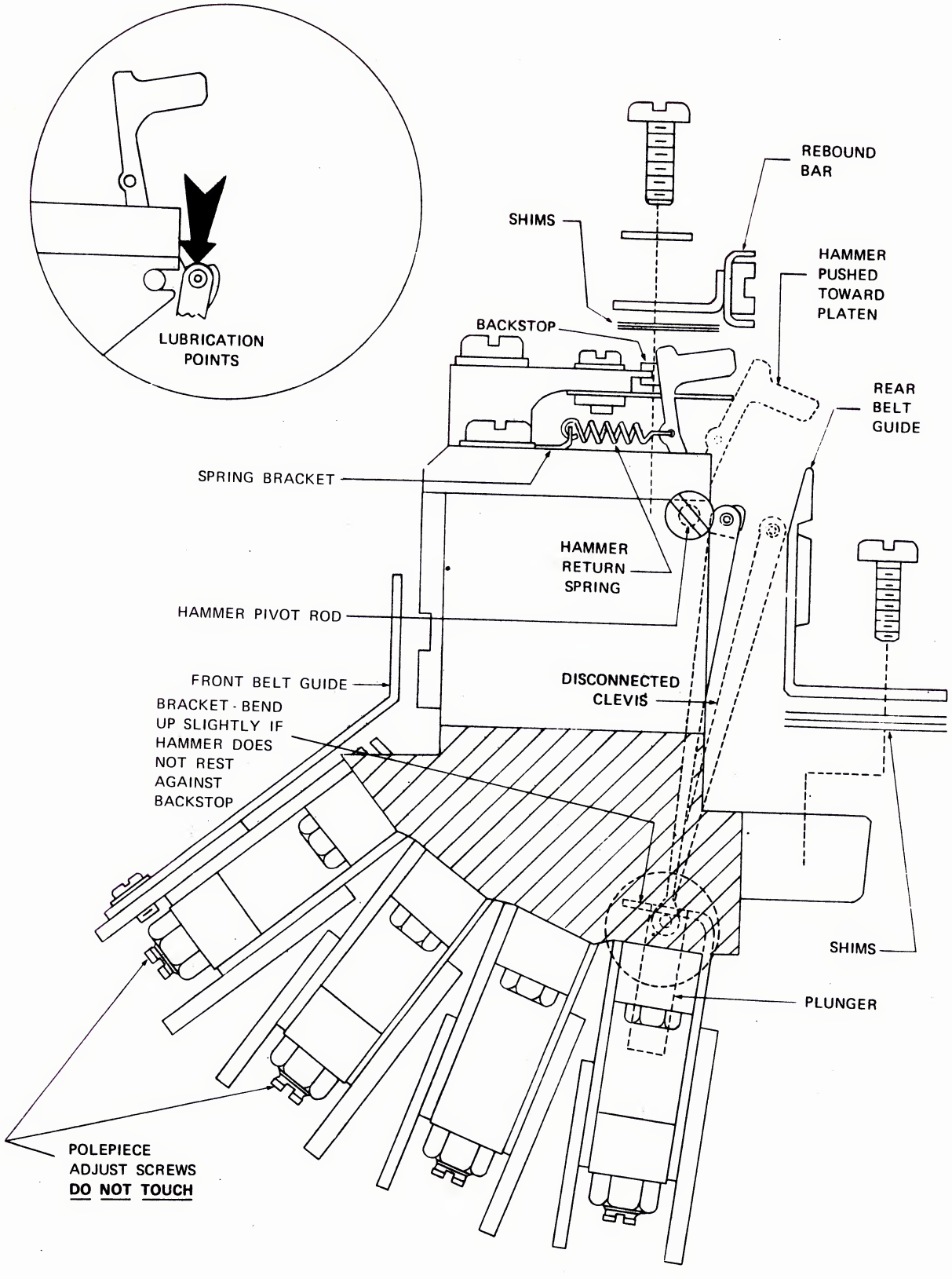
   Push down on center portion of rebound bar enough to disengage it from the two small brackets, and remove rebound bar.

4. Hold hammer and print belt assembly in a vertical position and gently shake it over a work surface to remove any remaining pieces of broken springs or other foreign objects. Rotate assembly around so that upper end will be down, and again shake assembly. Lay assembly on a work surface such that hammer faces are facing upward.

5. Locate the hammer with missing return spring and pull it forward.

6. Select an Allen wrench or similar object having an outside diameter slightly larger than the inside diameter of the replacement spring. Place the replacement spring over the end of the Allen wrench or similar object. Orient spring such that spring hook on free end will go over top and into

*Moly Dag 200 lubricant can be obtained from Acheson Colloids Co., Port Huron, Michigan 48060



PLH-6128

Figure 5-41. Clevis and Plunger Removal

corresponding hole in spring bracket. Also, spring must be oriented so that hook on hammer end will go through hammer spring hole the same way as it does on adjacent hammers.

7. Hook free end of spring into appropriate hole in spring bracket. With a spring hook, grip hammer end of spring, and carefully remove object used to support spring. Hook the spring into the hammer spring hole. Move hammer back and forth several times to make sure spring is properly installed.

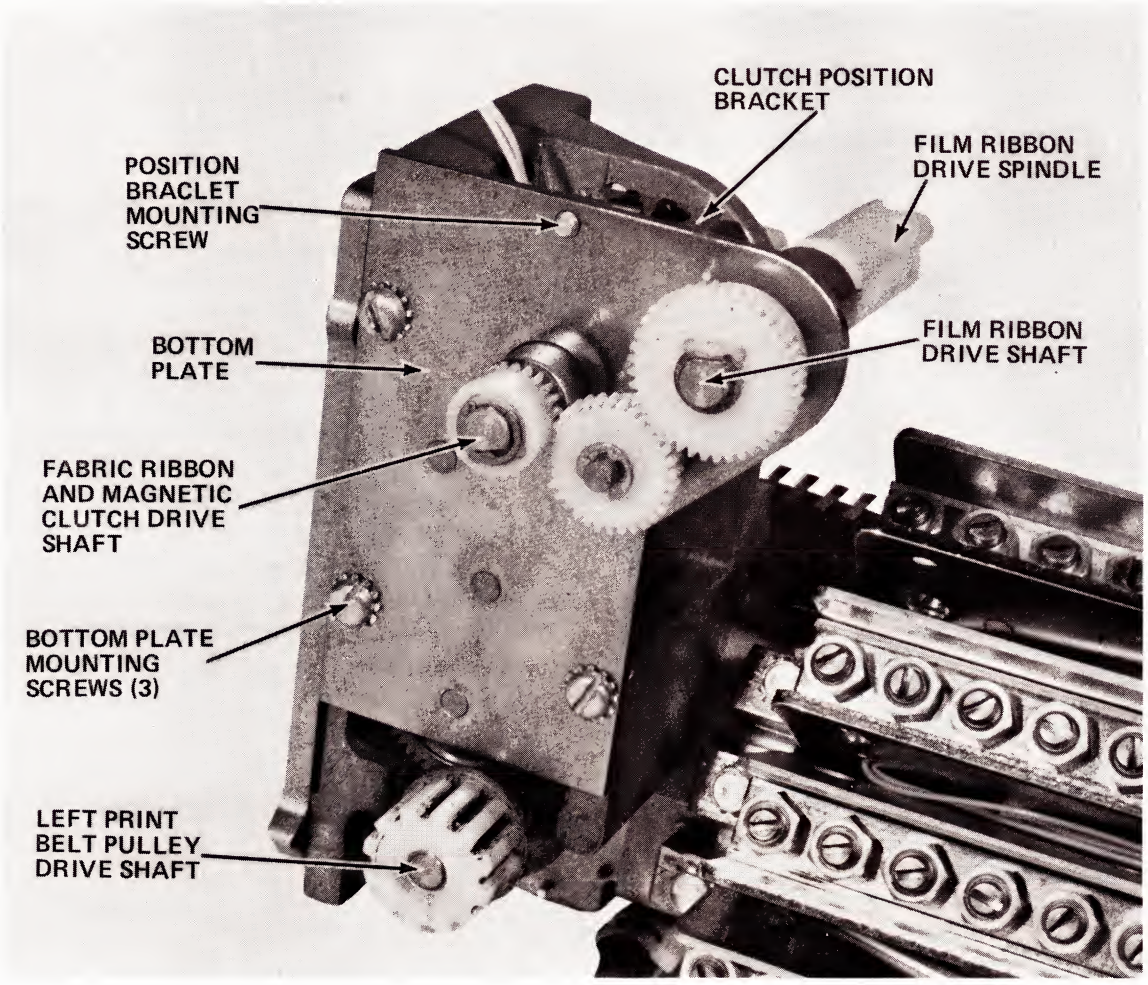
8. Check all other hammers to verify condition of hammer return springs. Replace any other springs that are missing or defective.

9. Inspect all upper clevis pins for evidence of lubricant. If these areas are dry, lubricate sparingly with DAG #200 lubricant. For a suggested technique to apply the lubricant, see item 13 in the preceding instructions.

10. Replace rebound bar. Make sure rebound bar is attached at center portion to the two clips provided by pushing up on bar.

11. Install print belt, rebound belt, and horizontal scale. Remove screw inserted in step 1.

12. Install hammer and print belt assembly, and ribbon cartridge.

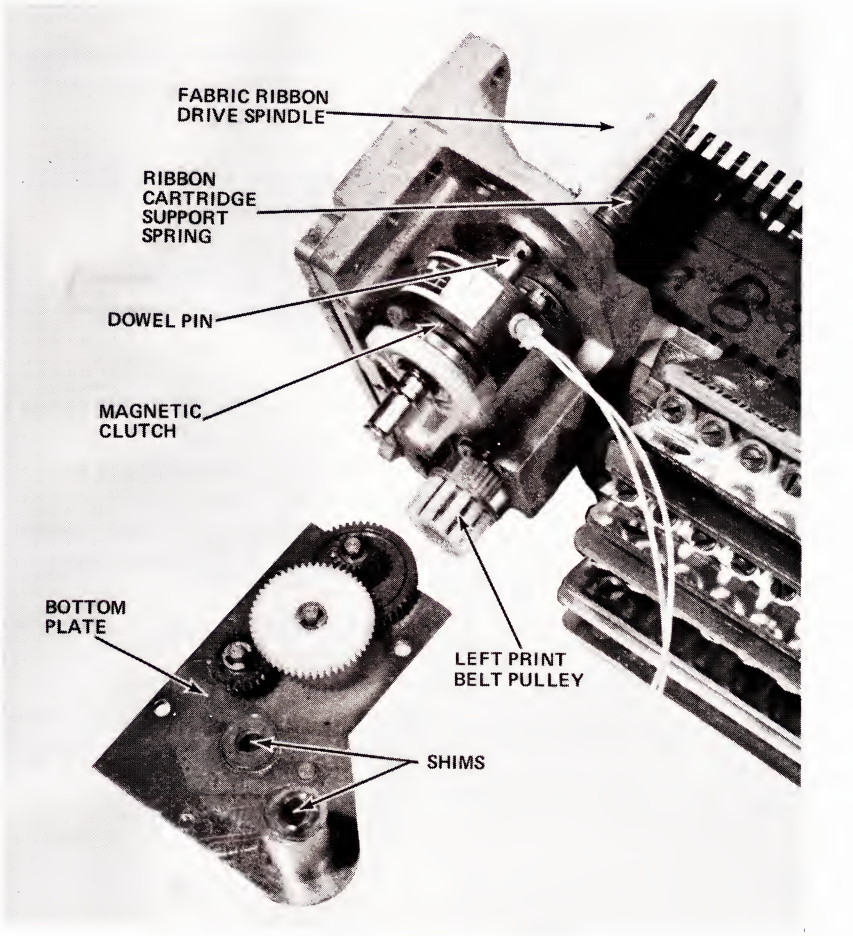


799-4-1003

Figure 5-42. Ribbon Magnetic Drive Clutch (Bottom View)

RIBBON MAGNETIC DRIVE CLUTCH
(Figures 5-42 and 5-43)

1. Open top cover.
2. Remove ribbon cartridge.
3. Remove hammer and print belt assembly from Corresponder.
4. On the bottom of the hammer and print belt assembly, remove the C-rings from the three gears and remove the gears.
5. Remove the remaining E-rings from gear shafts. The short shaft is for the film ribbon and the long shaft is for the fabric ribbon.
6. Slide the film ribbon drive shaft and spindle out of the mounting plate.
7. Remove the three slotted screws and star washers from the bottom plate.
8. Remove the hex head screw from the clutch position bracket and remove bracket.
9. Remove dowel pin in fabric ribbon shaft just above magnetic clutch.
10. Carefully tap fabric ribbon shaft up until bottom plate can be removed.



799-4-1007

Figure 5-43. Ribbon Magnetic Drive Clutch (Side View)

CAUTION

There are shims present on the fabric ribbon and film ribbon drive shafts. Be careful not to mix or lose these shims.

11. Remove the retaining ring from the bottom of the magnetic clutch.

12. Slide magnetic clutch off the fabric ribbon drive shaft.

13. Slide the fabric ribbon drive shaft and spindle out of the top of the casting.

14. To remove the spindle from the shaft, remove the retaining ring and dowel pin from just underneath the spindle and slide the shaft out of the top of the spindle.

NOTE

Before reassembling the ribbon drive and shaft assembly in the Corresponder, lubricate working surfaces of gears, gear clutch assembly, and shaft using lubricating grease (Lubriplate #630-AAME-D6A3).

15. Replace the magnetic clutch by reversing the above steps.

LEFT PRINT BELT PULLEY (Figures 5-37 and 5-43)

1. Open top cover.

2. Remove the hammer and print belt assembly from the Corresponder.

3. Remove the print belt and rebound belt.

4. Loosen the pulley set screw with an Allen wrench.

5. Remove the hex nut and flat washer from the top of the pulley.

6. Slide the pulley off the shaft being careful not to lose the shims on the bottom of the pulley.

7. Pull pulley shaft out from bottom until E ring on shaft is against top surface of bottom bearing. Firmly grasp shaft assembly by holding gear pulley. The bottom bearing can be worked out of the drive support casting by moving pulley shaft back and forth while pulling outward on shaft assembly. When bearing is worked free, pulley shaft assembly will come out of casting. Bearing can be removed from shaft assembly by removing E ring on shaft.

8. Top bearing can be removed by removing the two retaining screws from top of drive support casting and gently tapping bearing out with a slender, blunt-edged tool extended through casting from bottom side.

9. Before replacing pulley shaft assembly, slide bottom bearing on shaft and place E ring on shaft above bearing.

10. Gently press top bearing into top of drive support casting and replace the two retaining screws previously removed.

11. Insert pulley shaft through bottom of drive support casting, and gently press bottom bearing into casting.

12. Replace all of the shims previously removed over top of shaft.

13. Place print belt pulley on shaft keeping set screw lined up with flat side of shaft. Tighten pulley set screw.

14. Replace nut on top of shaft over pulley.

15. Replace print belt and traveling rebound belt.

16. Rotate print belt in a counterclockwise direction to check for binding in any of the moving parts.

17. Reinstall hammer and print belt assembly into Corresponder.

RIGHT PULLEY ASSEMBLY (Figures 5-37 and 5-44)

1. Open top cover.

2. Remove ribbon cartridge.

3. Remove traveling rebound belt and print belt.

4. Remove grip ring and spring washer from right pulley shaft, and slide pulley off shaft.

CAUTION

Make sure any removed shims are replaced on shaft before pulley is replaced.

5. Bearings in pulley are easily removed as follows:

   a. Place pulley in upright position on a work surface.

   b. Extend a slender, blunt-edged tool through top of pulley at a slight angle to make contact with top surface of bottom bearing. Gently tap tool while moving tool in a circular direction around rim of bearing until bearing drops out of pulley.

   c. Turn pulley over and repeat above procedure to remove top bearing.

6. Replace bearings in pulley by pushing them in place using finger pressure. Ensure that the bearing outer race will not rotate in pulley. If it does, carefully apply Loctite 222 or Grade H to bearing outer race prior to installation.

7. The belt tension spring can be removed by compressing it enough to allow it to slip out between the tension support casting and arm assembly. The spring can be replaced by reversing the above procedure.

8. Slide pulley onto pulley shaft.

9. Place spring washer over top of shaft.

10. Push grip ring onto shaft against spring washer.

    Make sure grip ring is pushed down far enough to remove all vertical play in pulley.

11. Rotate pulley to make sure there is no binding.

12. Replace print belt and rebound belt.

13. Install ribbon cartridge.

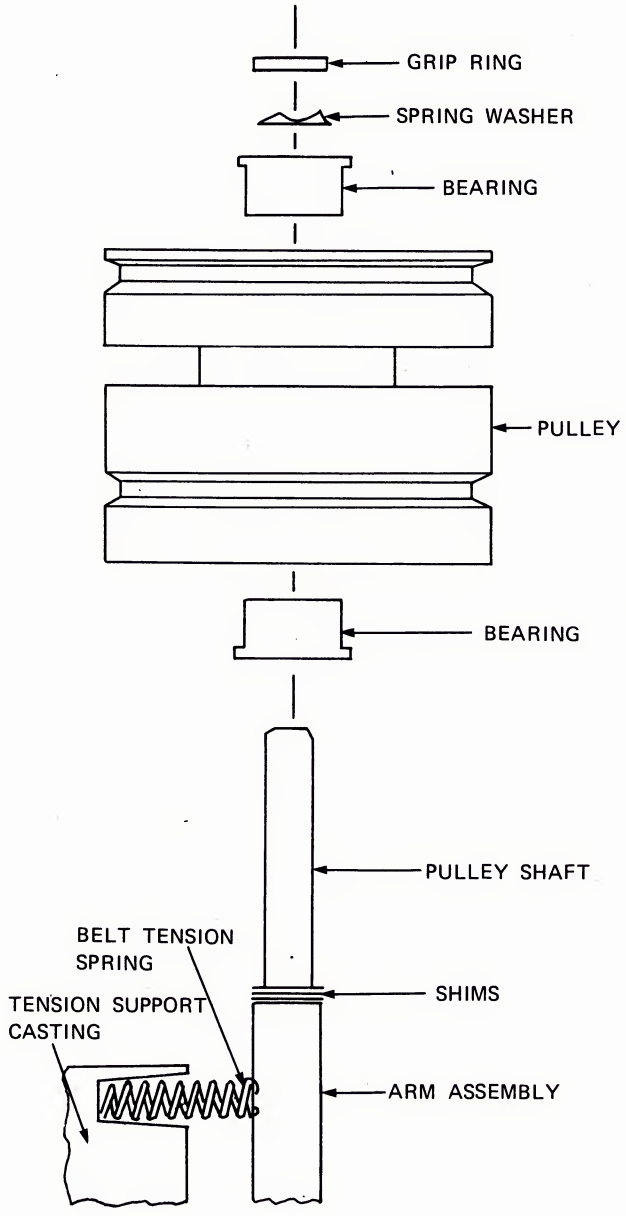


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Figure 5-44. Right Pulley Assembly

RIBBON CARTRIDGE SUPPORT SPRINGS (Figure 5-43)

There are two ribbon cartridge support springs located on the hammer and print belt assembly — one on the left side and one on the right side. These

springs fit over the cartridge support pins and can be replaced as follows:

NOTE

Replace both springs as a set when one spring requires replacement.

1. Open top cover.
2. Remove ribbon cartridge.
3. Pry tang on bottom end of spring up over shoulder at bottom of pin, and slide spring off pin.
4. When replacing spring, push tang end of spring over pin first so that tang will lock spring to pin by fitting over shoulder at bottom of pin.

CAUTION

Top part of spring must compress freely over pin.

5. Replace ribbon cartridge.

PHOTOCELL ASSEMBLY
(Figure 5-37)

1. Raise top cover.
2. Remove ribbon cartridge.
3. Remove rebound belt and print belt.
4. Remove toggle assembly.
5. Remove access cover under front left side of Corresponder.
6. Loosen photocell connector at front of main frame.
7. Remove small Allen Head screws from top and left end of photocell assembly. Also, remove spring from left end of assembly.
8. Pull cable (attached to photocell assembly) through space below hammerbank.
9. To replace the photocell assembly, push cable under hammerbank until the connector can be grasped by reaching up through the access hole under Corresponder. The cable can then be guided on through under hammerbank until the end reaches the connector at front of main frame. Connect photocell cable.
10. Set photocell assembly on positioning pins on top of pulley casting.
11. Start Allen Head adjustment screw through hole in left side of pulley casting. When threaded end of screw starts showing through hole, place one end of spring over end of screw. Push spring down into cavity on top of photocell assembly, and finish pushing screw through hole and spring. With Allen Head wrench of correct size, turn screw in until threads properly engage small nut in photocell assembly.
12. Insert top Allen Head screw through elongated hole in photocell assembly. Turn in screw until head is almost down on top of photocell assembly.
13. As a preliminary adjustment, turn adjustment screw at left until top screw is centered with respect to elongated hole. Tighten top screw.
14. Replace access cover, paper tensioner, print belt, rebound belt, and ribbon cartridge.

PHOTOCELL TIMING (PHASING) ADJUSTMENT

Make the final adjustment of the photocell as follows:

1. Print two lines of characters by activating the internal test circuit in the Corresponder.
2. Place a timing gauge (44A410619-G01), over hammers on left end of hammerbank by placing slots on underside of gauge over the hammers. The top part of gauge must be over printed characters on paper.
3. Check centering of characters appearing between hairlines on gauge. If characters are consistently to right or left of the distance between hairlines, adjust photocell timing as follows:
   a. Loosen top Allen Head screw on photocell assembly and turn adjustment screw as required.

b. If characters between hairlines are too far to left, turn adjustment screw counterclockwise.

c. If characters between hairlines are too far to right, turn screw clockwise.

d. Tighten top screw on photocell assembly.

4. Replace ribbon cartridge and use timing gauge to check timing (phasing) at left, middle, and right end of print line. If character alignment (with respect to gauge) is correct in one or two positions in print line, but slightly out of alignment in another position, an additional fine adjustment of photocell may be needed to average out the difference. This will result in a more consistent character alignment across the entire printed line. If gapping persists after photocell adjustment, replace photocell assembly.

5. Install outer gear plus shims (if any) onto platen shaft and secure in place with a grip ring.

6. Insert clutch shaft with attached platen knob into end of platen shaft, and secure with dowel pin in clutch assembly.

7. Check platen assembly as follows:

a. Bushing on right end of platen shaft should turn freely.

b. Push and hold platen knob in. Inner gear should turn freely.

c. Release platen knob. Platen knob and clutch shaft should snap back with clutch engaging inner gear.

POWER SUPPLY
(Figure 5-26)

1. Disconnect Corresponder from AC power source.

2. Raise top cover.

3. Remove cosmetic shield.

4. Remove power supply cover.

5. Remove all connectors on XPS board.

6. Remove wire leads from motor start capacitor located on power supply.

7. Remove four power supply hex head mounting screws and lift power supply out of main frame.

8. Replace power supply by reversing steps 4 through 7.

9. Turn power on, and check Corresponder operation.

10. Replace cosmetic shield and lower top cover.

RUN/LOAD SWITCH
(Figurese 5-8 and 5-45)

1. Raise top cover.

2. Place RUN/LOAD switch in the LOAD position.

3. Label the three wire leads to switch, and using a pencil tip soldering iron, remove leads from switch.

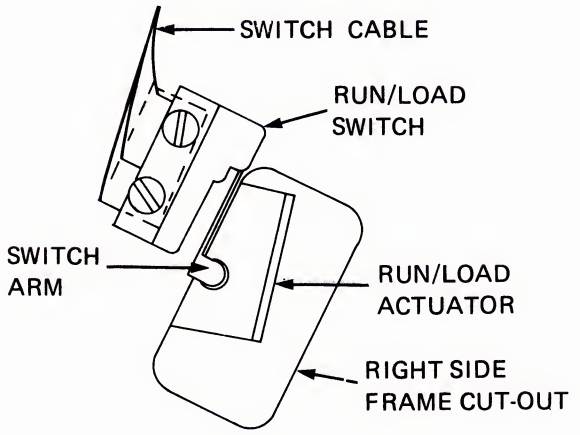
4. Remove the two switch mounting screws, retaining plate, and switch from right side frame.

5. Replace switch with the two mounting screws and retaining plate removed in step 4.

6. Solder wire leads to switch terminals.

7. Turn Corresponder on using top cover interlock switch.

8. Check RUN/LOAD switch by moving RUN/LOAD lever alternately to the RUN and LOAD positions. Corresponder should turn off when lever is placed in the LOAD position. When lever is placed in the RUN position, it should be possible to start Corresponder by pressing MOTOR ON pushbutton on control panel. If switch requires adjustment, it should be adjusted by placing RUN/LOAD lever in RUN position and adjusting switch roller against protruding arm (actuator) until switch activates.



PLH-6036

Figure 5-45. RUN/LOAD Switch Adjustment

AC SWITCH AND FILTER ASSEMBLY (Figures 5-46 and 5-47)

The AC switch and line filter are housed in the metal box on the top right side of the bustle assembly. The replacement procedure is as follows:

1. Disconnect AC line cord.
2. Remove front and rear pedestal covers.
3. Remove bustle assembly from pedestal.
4. Disconnect the two wires to bottom cooling fan in bustle, and loosen cable clamps securing these wires to right side of bustle. Pull wires out of cable clamps.
5. Disconnect AC power input plug on bottom of switch box.
6. Find AC power output cable from switch box. Remove connector on this cable from bracket on rear of pedestal. Also, remove cable clamp securing this cable to right side of bustle.
7. Disconnect switch box ground wire from bustle frame.
8. Remove the two hex head screws from right front corners of switch box and remove switch box with enclosed line filter from bustle assembly.

NOTE

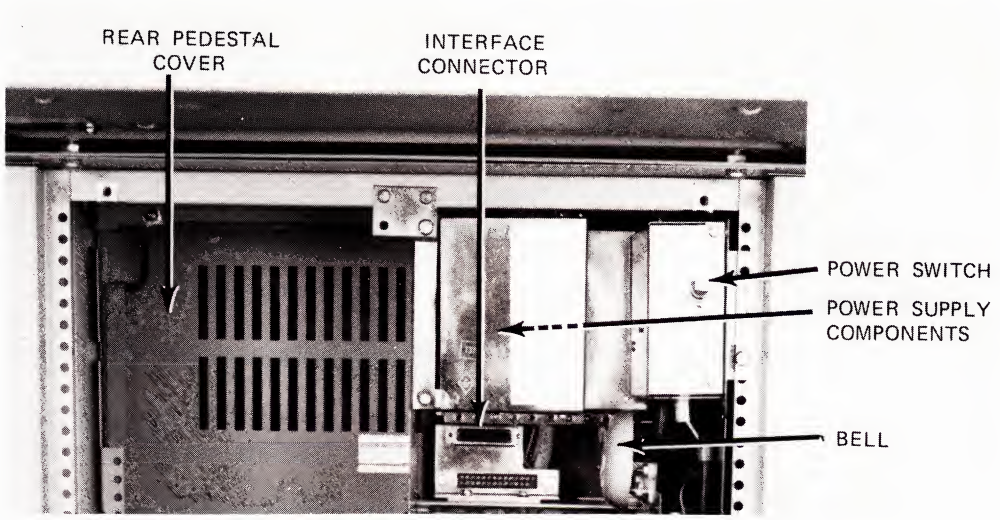
When replacing either the AC line filter or switch, see Figure 5-46 and Table 5-9 for correct wire connections.

9. Reinstall AC switch box by reversing steps 3 through 8.
10. Connect AC line cord to power source, and check switch operation.
11. Reinstall front and rear pedestal covers.

TABLE 5-9

AC SWITCH AND LINE FILTER CONNECTIONS

WIRE COLOR	FROM	TO
Black	P24-3	SW4-1
White	P24-1	SW4-2
Brown	SW4-3	Line Filter (Line Side)
Blue	SW4-4	Line Filter (Line Side)
Green	Frame of Power Supply	Line Filter (Line Side)
Brown	TB1-3	Line Filter (Load Side)
Blue	TB1-1	Line Filter (Load Side)
Black	J11-1	TB1-3
White	J11-2	TB1-1
Green/Yellow	J11-3	Connec. to Frame of Bustle (E22)
Black	J15-1	TB1-3
White	J15-3	TB1-1



PLH-6086

Figure 5-46. Upper Pedestal Assembly

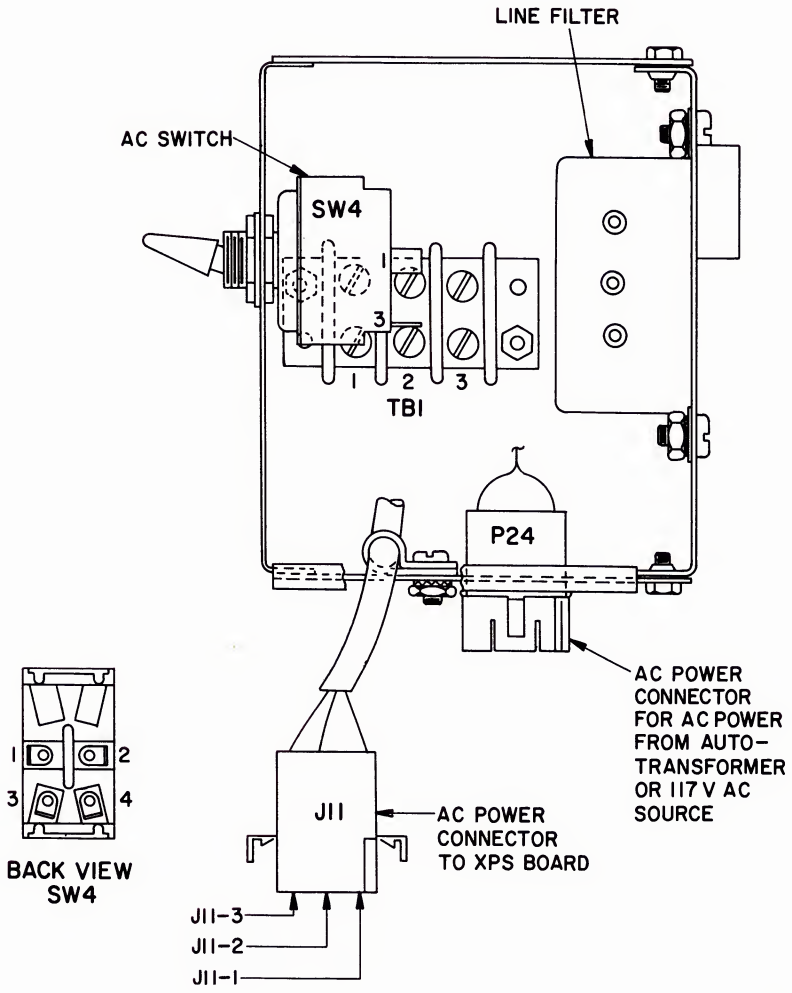


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Figure 5-47. AC Switch and Filter Assembly

POWER SWITCH
(Figure 5-46)

1. Disconnect Corresponder from AC power source.
2. Remove front pedestal cover.
3. Remove the two screws from front of switch housing.
4. Remove wires from switch and remove switch from housing.
5. Replace switch, connect wires to switch terminals, and replace housing with screws removed previously.
6. Connect Corresponder to AC power source and check switch operation.
7. Replace front pedestal cover.

BELL
(Figure 5-46)

1. Turn power off.
2. Remove front pedestal cover.
3. Remove bell gong secured with a slotted screw.
4. Loosen bell assembly from pedestal by removing the two mounting nuts and star washers.
5. Rotate bell assembly to expose two screw terminals on bottom. Remove the lead wires from terminals.
6. Replace bell by reversing steps 3 through 5 above.
7. Turn power on, and check operation of bell.
8. Replace front pedestal cover.

APPENDIX A
AUTOMATIC SHEET FEEDER - DUAL HOPPER
PART NO. 44A501653-001)
INTRODUCTION

GENERAL DESCRIPTION

The optional Sheet Feeder enhances the usefulness of any TermiNet 510 Corresponder by allowing rapid, automatic feeding of cut sheet paper. Before a Sheet Feeder can be installed on a Corresponder, additional parts must be installed on the Corresponder. These parts are installed at the factory when the Corresponder and Sheet Feeder are ordered together. However, if the Corresponder is ordered without a Sheet Feeder, the additional parts are not factory installed. This means that if a Sheet Feeder is to be installed later, the additional parts required on the Corresponder must be installed in the field. A kit is available for field installation. The kit includes the mounting hardware for the standard dual hopper model. The part number of this kit is 44D416098-G02. Once the essential Corresponder parts are installed, they usually remain permanently installed. The Corresponder parts required for Sheet Feeder operation are described as follows:

- Top Cover mounting brackets. These brackets support the locator shaft. The locator shaft in turn supports the Sheet Feeder mounting bracket assembly to which the Sheet Feeder is mounted.

- Paper pan. This is installed under the platen and includes the paper out sensor and friction feed switch. The paper out sensor is used for sensing a paper out condition when the Sheet Feeder is employed. The friction feed switch sets up the Corresponder's electronics for either the sheet feed mode or continuous forms feed mode.

- Tractor drive shaft gear and friction rollers. The tractor drive shaft gear is installed on the tractor drive shaft. This gear drives the drive shaft and gear on the mounting bracket assembly through a gear train. The drive shaft and gear on the mounting bracket assembly in turn drives the Sheet Feeder. The friction rollers, also installed on the tractor drive shaft, assist in friction feeding single sheets of paper through the Corresponder.

- Friction Feed Assembly. This assembly requires no tools to install. It simply latches onto the forms tractor tie rod. Unlike the other Corresponder parts previously discussed which normally remain installed, this assembly must be removed by the operator whenever the Corresponder is to be operated in the continuous forms feeding mode. When the Sheet Feeder is employed, the friction feed assembly guides each individual sheet of paper fed to it from the Sheet Feeder through the Corresponder. When each sheet of paper is completely printed and ejected by the Corresponder, the friction feed assembly guides it into the output hopper of the Sheet Feeder.

Once a Corresponder has been equipped with the above required parts to permit it to operate a Sheet Feeder, the following items are also required to permit automatic sheet feeding:

- Automatic Sheet Feeder. This device is available in either of two models — single hopper or dual hopper. The Sheet Feeder is entirely mechanical requiring no electrical connections. It is driven from the paper feeding mechanism in the Corresponder through gears in the mounting bracket assembly. The Sheet Feeder is controlled by the Corresponder's forward/reverse platen movements which are controlled by the software in the Corresponder.

- Mounting Bracket Assembly. This assembly attaches to the top cover of the Corresponder. The purpose of this assembly is to —

  1. Support the Sheet Feeder.

  2. Align the Sheet Feeder with the Corresponder.

  3. Transfer mechanical power to the Sheet Feeder from the Corresponder's paper feed mechanism.

SPECIFICATIONS

SHEET FEEDER

Size

	IN.	CM.
Height:	14.4	36.5
Width:	12.0	30.5
Depth:	12.5	31.8

Weight

15.5 lbs. (7.0 kg)

Exterior Color

Black

Paper Tray Capacity

200 sheets of 20 lb. (75.2 g/m^2) paper

Restacking Hopper Capacity

200 sheets of 20 lb. (75.2 g/m^2) paper

Paper Tray Cassettes

One paper tray cassette is supplied with single hopper models and two are supplied with dual hopper models Unless specified otherwise, paper tray cassettes to accommodate 8.5 in. (21.6 cm) x 11.0 in. (27.9 cm) paper sheets are supplied. Paper tray cassettes to accept other paper sheet sizes are also available as follows:

- 8.5 in. (21.6 cm) W x 14.0 in. (35.6 cm) L
- Metric standard A4 (21 cm W x 29.7 cm L)

Environmental (Sheet Feeder Installed on Corresponder)

Operating:

- Temperature: 45 to 110°F (10 to 44°C) – Temperature variation not to exceed 15°F (8°C) per hour
- Relative Humidity: 40 to 80% (No condensation)

Storage:

- Temperature: –22 to 158°F (–30 to 70°C) (See other environmental specifications for the Corresponder in Chapter One)

PAPER

Size

Several standard paper sizes are accommodated by using the appropriate paper tray cassettes. The standard paper sizes are as follows:

- 8.5 in. (21.6 cm) W x 11.0 in. (27.9 cm) L
- 8.5 in. (21.6 cm) W x 14.0 in. (35.6 cm) L
- Metric standard A4 (21 cm W x 29.7 cm L)

Paper Width Tolerance

± .020 in. (0.5 mm)

Paper Weight

15 lb. (56.4 g/m^2) to 24 lb. (90.2 g/m^2)

Type and Quality

Plain bond, typewriter quality paper with a light wood pulp content should be used for optimum results.

Grain Orientation

No grain is preferred, but if a grain must be present then its axis must be from top to bottom of the sheet.

Storage

- Temperature: 64.4 - 68°F (18-20°C)
- Relative Humidity: 45 - 55%

INSTALLATION

Installation instructions for the Sheet Feeder and related Corresponder parts can be found in the Operating and Installation Instructions for the Automatic Sheet Feeder Accessory, GEK-49395.

OPERATION

Operating instructions for the Sheet Feeder can be found in the Operating and Installation Instructions for the Automatic Sheet Feeder Accessory, GEK-49395.

PRINCIPLES OF OPERATION

CORRESPONDER

The following discussion applies only to Correspondents equipped with the required parts to operate a Sheet Feeder.

FRICTION FEED SWITCH

The friction feed switch is located on the paper pan near the right end of the platen. The purpose of this switch is to allow the operator to select either the sheet feeding mode or the continuous forms feeding mode. When the switch is placed in the "Sheet" mode, the electronics in the Corresponder are activated as follows:

1. The paper out or paper low signals from the continuous forms paper sensors are ignored.

2. The paper out sensor on the paper pan used for sensing cut sheet paper is activated.

3. Paper vertical programming formats are inhibited. Vertical paper moving codes VT and FF are not recognized as paper moving commands. Instead, they are interpreted by the electronics as commands to generate a sequence of platen forward/reverse movements. These platen movements are dictated by the software program residing in the RFC circuit board, and mechanically cause the Sheet Feeder to select a sheet of paper from either bin one (FF code) or bin two (VT code) depending on the sequence of platen movements as follows:

PLATEN DIRECTION	BIN ONE	BIN TWO
Reverse	6	9
Forward	4	4
Reverse	36	48
Forward	28	28

NOTE

If an INT/2 interface is used, the VT and FF codes are not standard VT and FF ASCII codes. Instead, VT and FF are the equivalent of ASCII codes SP and DLE.

4. The Test function is inhibited. Instead, the electronics interprets activation of the TEST pushbutton as a command to eject paper in the Corresponder without selecting another sheet from the Sheet Feeder. When the TEST pushbutton is pressed on the front control panel, signal $\overline{\text{VTC}}$ goes to 0V. This causes the software on the RFC circuit board to subtract the line count for the sheet in process from the line count corresponding to the maximum paper length. The paper feed servo is then commanded to move the paper the remaining distance at 6 lines per inch while checking for paper out. (A paper out condition is defined as nine consecutive line feeds with no paper sensed.) Once paper out is established, the paper feed servo is commanded to move the paper 35 more lines at 6 lines per inch. This amount of movement is necessary to completely remove the paper from the Corresponder and deposit it into the output hopper of the Sheet Feeder.

Another function of the friction feed switch is to mechanically engage the friction rollers in the paper pan when it is placed in the "Sheet" mode. When the friction feed switch is placed in the "Forms" mode, the friction rollers in the paper pan are disengaged and the electronics in the Corresponder are activated as follows:

1. The sheet feed paper out sensor in the paper pan is deactivated.

2. The continuous forms paper out/paper low sensors are activated.

3. The FF and VT codes cause the Corresponder to execute a form feed or a vertical tab in accordance with the vertical format programming.

4. When the TEST function is activated the Corresponder prints a random test pattern.

PAPER OUT SENSOR ("SHEET" MODE)

The sensor, mounted under the platen, is a photoreflective type of device that shines a light on the printed side of the paper. The sensor determines the presence of paper by its sensitivity to the amount of light reflected back by the paper. This method of paper sensing necessitates some restrictions on the use of preprinted forms or letters (see Figure A-1 below). Using the outputs from the paper sensor, the electronics in the Corresponder can detect a paper jam as well as a paper out condition and produce an alarm. A paper out condition will occur when the paper sensor senses nine consecutive lines without paper during loading or ejecting cycles.

As the paper feeds through the Corresponder, the paper sensor scans an area 0.3 in. (7.6 cm) wide on the printed side of the paper (see Figure A-1). The approximate location of this area is 2.6 in. (6.6 cm) to 2.9 in. (7.4 cm) from the left edge of the sheet. To prevent a false paper out indication, preprinted forms must conform to the following requirements:

- In the top 1.5 in. (3.8 cm) of the scanning area (area A in Figure A-1), there must be at least one clear area (not preprinted) vertically of 0.20 in. 5.1 mm) or greater.
- In the scanning area below 1.5 in. (3.8 cm) from the top of the paper (area B in Figure A-1), the maximum, continuous solid, preprinted area allowed vertically is 0.62 in. (1.57 cm).

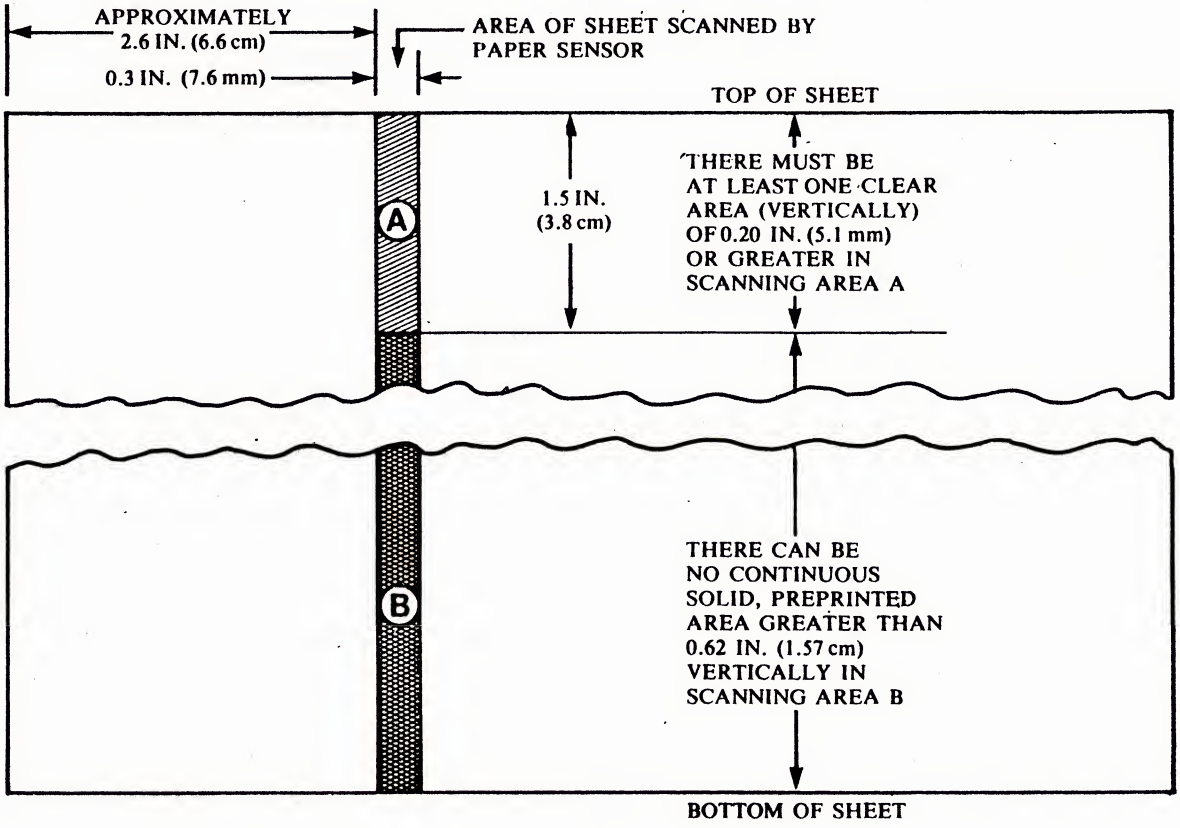

Figure A-1. Paper Sensor Scanning Area on Printed Side of Paper

RIBBON AND PAPER FEED CONTROL (RFC CIRCUIT BOARD)

The RFC board located in the pedestal of the Corresponder includes all circuits and software required for interpreting and acting on signals from the cut sheet paper sensor and the friction feed switch. See "Ribbon and Paper Feed Control (RFC)" in Chapter 4 for a complete description of the operation of this board.

Figure A-2 on next page illustrates the interface between the cut sheet paper out sensor, friction feed switch, and RFC circuit board.

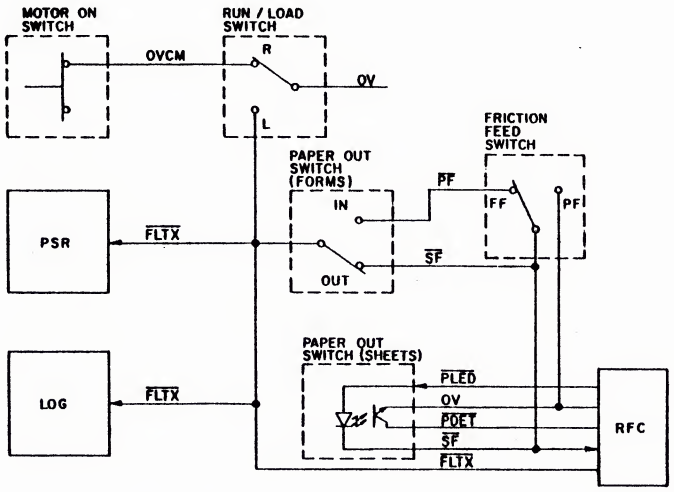

Figure A-2. RFC Interface for Sheet Feed Operation

AUTOMATIC SHEET FEEDER

The Sheet Feeder is strictly a mechanical device and is totally controlled and driven by the paper feeding mechanism in the Corresponder. Therefore, operation of the Sheet Feeder is a function of the platen movements in the Corresponder which are in turn controlled by the software program residing in the electronics of the Corresponder.

The Sheet Feeder provides two basic functions:

1. Selects a single sheet from either feed tray one or feed tray two and transports the sheet selected to the platen in the Corresponder.

2. Transports the printed sheet into the output hopper as soon as the sheet leaves the platen friction path.

The Sheet Feeder basically consists of three subassemblies:

1. Form Guide and Form Transport
2. Drive Mechanism
3. Paper Feed Tray

FORM GUIDE AND FORM TRANSPORT

Figure A-3 illustrates the paper guide and paper transport system. The paper feed trays are shown in their operating position.

The insertion (pick-up) rollers and transport rollers are driven by the paper feed mechanism in the Corresponder. This motion is transmitted via the mounting bracket gear train.

Two mechanical "selection and feed" units, one for each insert (pick-up) roller shaft provide the feed tray selection and the sheet insertion to the platen. The sheet separated from tray one will be transported above the paper insertion chute to the friction rollers of the platen. Sheets separated from tray two will be guided through the paper insertion chute to the Corresponder platen. The compensating rollers located within the paper insertion chute insures proper vertical registration and a minimal paper skewing. Once the sheet being transported by the insertion (pick-up) rollers has reached the platen friction path, sheet insertion carried out by the feeder will be terminated. Further sheet transport until the first print line and during the entire print operation will be carried out by the Corresponder's platen only. While the Corresponder is positioning the sheet to the first print line, the "selection and feed" unit that was active will be set to its home position automatically.

When the Corresponder has finished printing the sheet, it will be transported into the eject chute by platen motion. As soon as the sheet reaches the transport rollers of the feeder, it will be transported into the output hopper. The transport roller shaft is permanently driven by platen motion in the forward direction.

The manual form insertion chute allows the manual insertion of single sheets. To assure accurate print registration, the sheet width should be the same as the chute width.

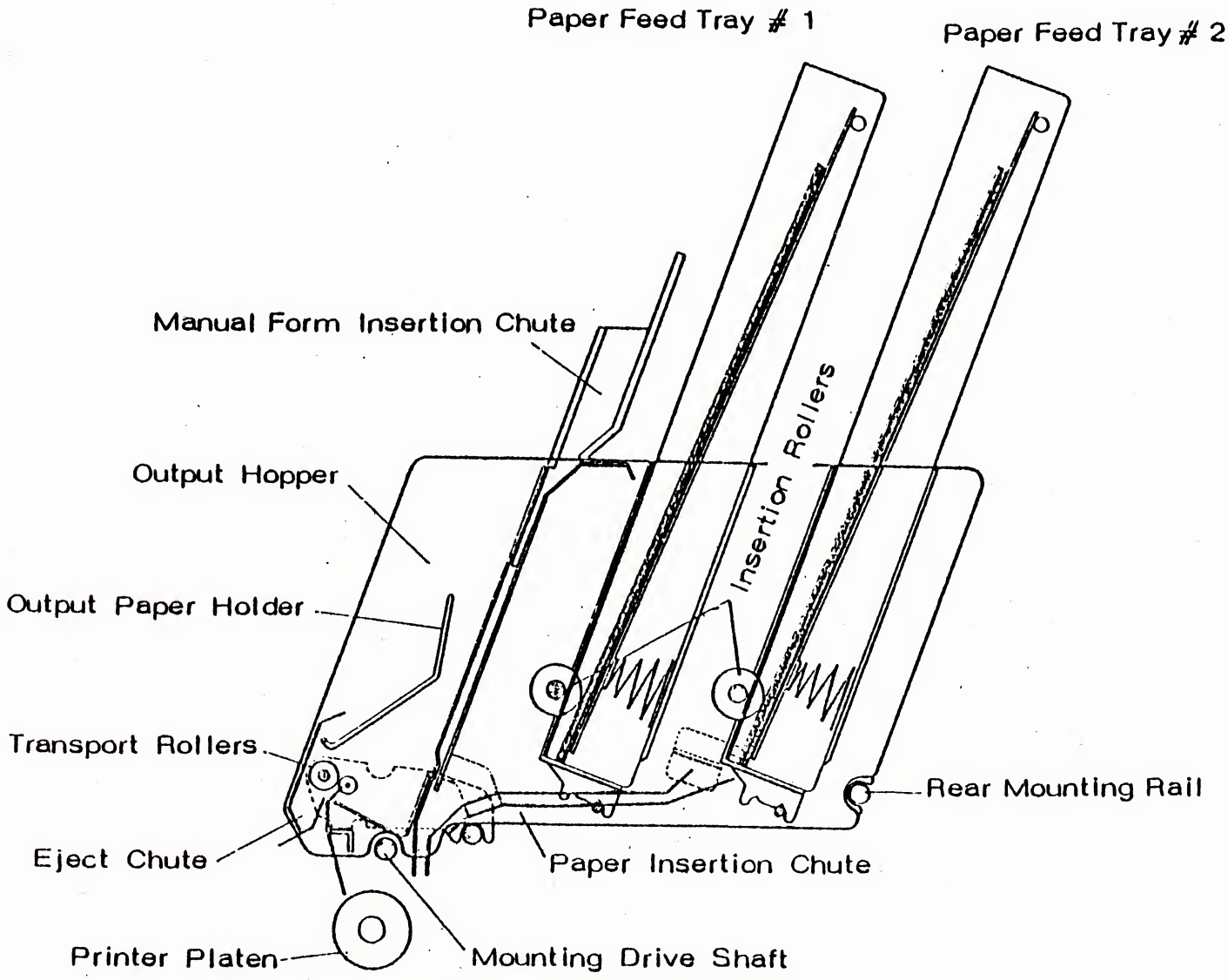

Figure A-3. Sheet Feeder Transport Details

DRIVE MECHANISM

The feeder drive gear engages with the mounting bracket drive gear which transmits Corresponder platen motion. Rotation of the feeder drive gear is transmitted via a timing belt to the transport roller shaft and the two drive wheels of the "selection and feed" units. These units are located on the right side frame of the feeder.

Each insertion (pick-up) roller shaft and the transport roller shaft is driven by means of a one-way clutch. This prevents reverse motion of these rollers.

The purpose of the "selection and feed" units is to select one insertion (pick-up) roller shaft and transmit the platen motion to this shaft until the selected sheet has been fed to the platen friction rollers in the Corresponder.

Each "selection and feed" unit is made up of a drive wheel assembly and a catch plate assembly. The selected unit is engaged by a latching action that depends on the forward/reverse movements of the drive wheel. This motion is mechanically transferred from the paper feeding mechanism of the Corresponder.

MAINTENANCE

To obtain reliable, trouble-free operation of the Sheet Feeder, the following recommended preventive maintenance should normally be performed every 6 months or 1000 hours of use, whichever comes first. It is also recommended that during each inspection of the Corresponder, the Sheet Feeder should also be functionally tested. The preventive maintenance procedure involves:

- Cleaning
- Lubrication
- Checkout

NOTE

Operator cleaning and lubrication should be carried out weekly when usage is heavy. See "Operator Maintenance" in the Operating and Installation Instructions for the Automatic Sheet Feeder, GEK-49395.

CLEANING

The following cleaning procedures should be followed during preventive maintenance periods:

- Remove both side covers and the front cover. This will expose all bearings and transport rollers.
- Remove all paper dust from the feeder using a suitable brush. Brush all paper dust from the knurled transport rollers.
- Clean all rubber rollers (insertion and pinch rollers) with a suitable platen cleaner.

CAUTION

Clean the pinch rollers only by pressing them against the transport rollers, otherwise the pinch roller springs could be damaged.

- Check the pinch roller springs. If one or more of the springs are damaged, replace the pinch roller assembly. Refer to "Parts Replacement and Adjustments — Sheet Feeder" for procedure.
- Examine the insertion (pick-up) rollers. Should one or more of the rollers be damaged or unevenly worn, the complete shaft must be replaced. Refer to "Parts Replacement — Sheet Feeder" for procedure.
- Examine the plastic coating on the paper guide plates. Loose coating could cause paper jams.
- Ensure that the paper deflector plate is not damaged or loose. If it is damaged, the front cover assembly should be replaced.
- Remove the friction feed assembly from the Corresponder. Using a small brush, remove all paper dust from the device. Place the assembly bottom side up on a work surface. Clean the two long steel rollers underneath the assembly. Check to see if these rollers turn easily. If any stiffness is felt when turning these rollers, follow the "Lubrication" instructions below.
- Remove the platen from the Corresponder. Using a suitable platen cleaner and a lint-free cloth, thoroughly clean all surfaces of the platen, paper pan rollers, and the two friction rollers on the tractor drive shaft.
- Using a small brush, remove paper dust from the paper pan — especially in the paper out sensor area.
- Remove the ribbon cartridge. Using denatured alcohol and a cotton swab, clean ink deposits off rollers on the ribbon deck plate.

LUBRICATION

The Sheet Feeder contains sintered metal bushings with permanent factory lubrication. However, as a result of paper dust or a long period of operation, some lubrication may be required. Determine when lubrication is required by checking for stiffness when manually rotating shafts.

CAUTION

Do not over lubricate. Excessive lubrication will migrate onto the paper feed rollers and cause paper feed problems. Use only a grade of oil suitable for use on sintered metal bushings.

- When required, place two drops of oil at each location illustrated in Figure A-4.

- If necessary, clean the gear wheel studs with denatured alcohol.

- Check for free operation of the selector latches and the drive wheel assemblies (see Figure A-5). Lubricate if necessary.

- Ensure that the turnout lever and the engaging lever on the catch plates operate freely (see Figure A-5). If necessary, clean with denatured alcohol – DO NTO USE LUBRICANT ON THESE PARTS.

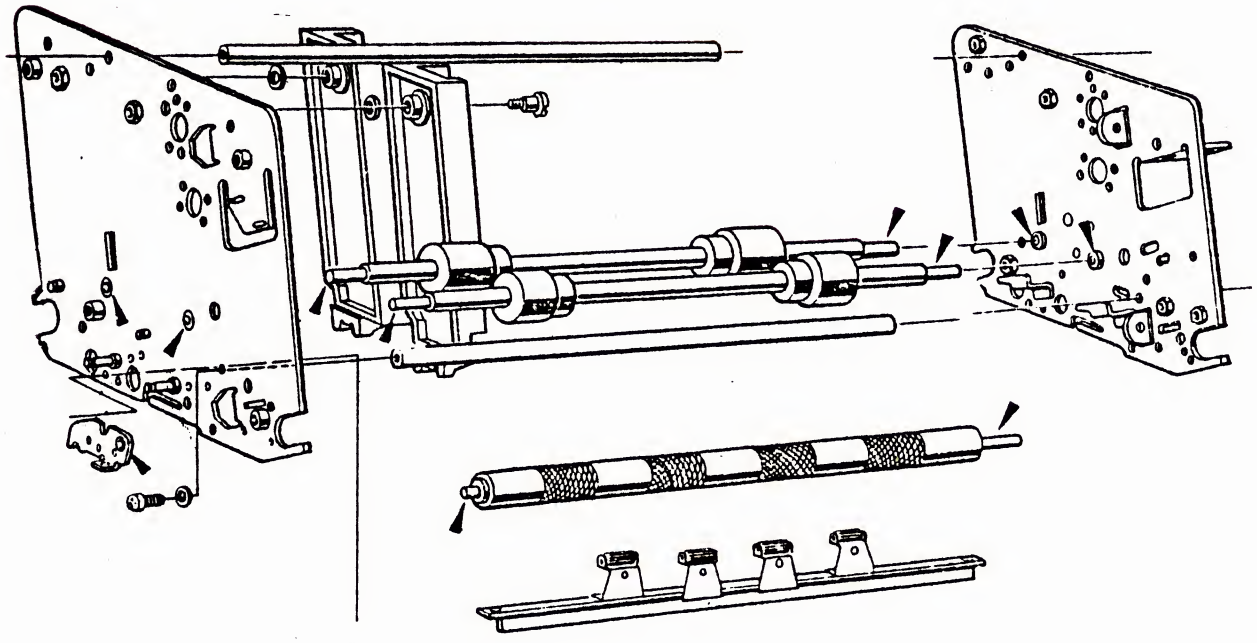

Figure A-4. Lubrication Points – Sheet Feeder Shafts

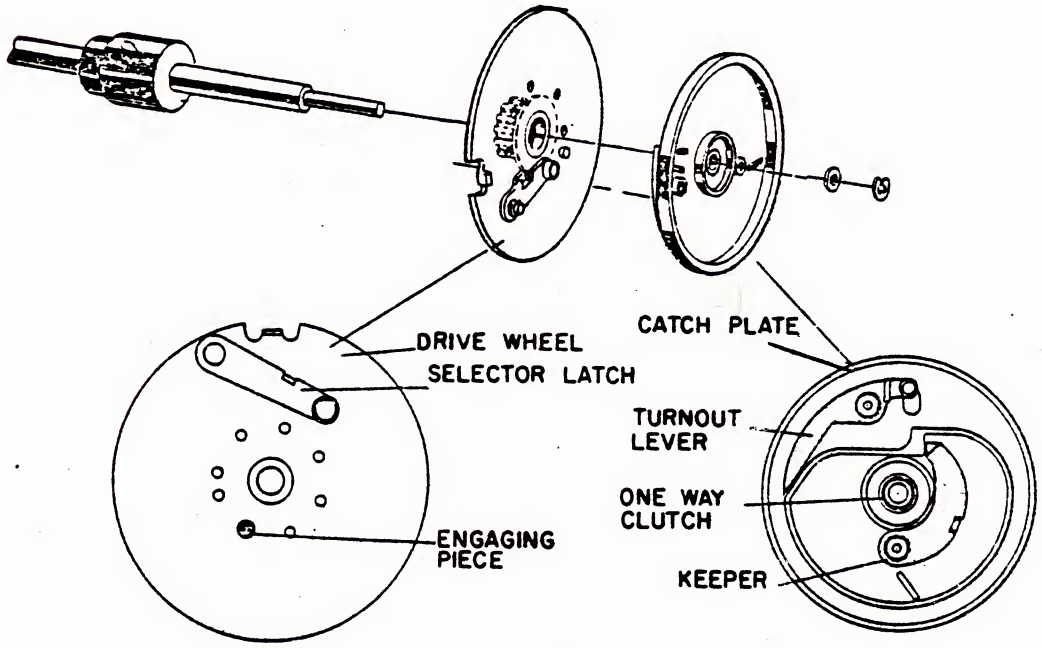

Figure A-5. Drive Wheel Details

- Remove the friction feed assembly from the Corresponder. Check the two long steel rollers underneath the assembly for free rotation. If any stiffness is felt, place two drops of oil on each roller bearing. Location is illustrated in Figure A-6.

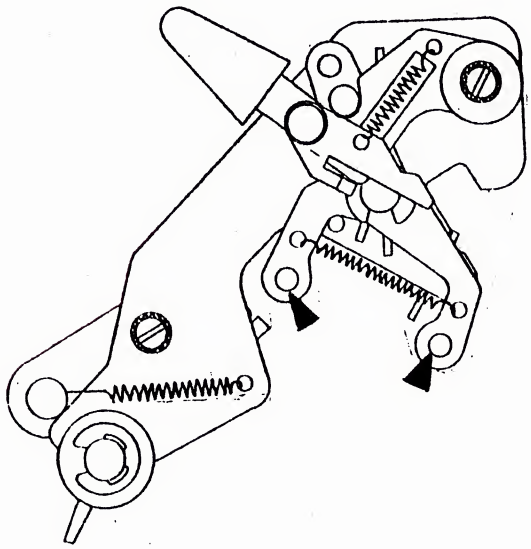

Figure A-6.
Friction Feed Assembly Lubrication Points

CHECKOUT

Before doing an operational checkout, check that all adjustments listed in Table A-1 Adjustments are correct, and perform the following:

- Use only new condition paper which complies with the paper specifications previously stated in this Appendix.
- Make sure each paper feed tray is properly loaded and locked in the operating position.
- Make sure the output hopper is empty.
- Set both the RUN/LOAD and friction feed levers on the Corresponder in the "up" position.

NOTE

The friction feed lever locks in the downward position. To raise lever to upward position, it is necessary to first slide it to the left to unlock it, and then move it upward.

- Make sure a ribbon cartridge has been installed on the Corresponder. See Chapter 2, "Installation and Checkout" for correct procedure.
- Apply power to the Corresponder and turn power switch "on."

Perform an operational checkout. If necessary, refer to "Operational Checkout" in the Operating and Installation Instructions for the Automatic Sheet Feeder Accessory, GEK-49395.

ADJUSTMENTS

Table A-1 includes adjustments necessary to ensure reliable operation of the Sheet Feeder. The location of each numbered adjustment is illustrated in the referenced figure in the table.

TABLE A-1

ADJUSTMENTS

ITEM AND LOCATION	FIG. NO.	SPECIFICATION
1. Rear edge of paper rack bracket to rear edge of locator shaft bracket (measured along top surface of Corresponder top cover).	A-7	.82 to .95 in. (20.8 to 24.1 mm)
2. Left end of locator shaft to outside surface of locator shaft bracket.	A-7	1.84 ± .06 in. (4.7 ± .15 cm)
3. Drive shaft on mounting bracket assembly relative to tractor drive shaft. Both mounting bracket assembly rollers must contact platen while checking this adjustment.	A-7	Must be parallel.
4. Mounting bracket assembly support legs.	A-7	At height so as to allow weight of sheet feeder to be evenly distributed between platen, locator shaft and support legs.
5. Idler gear on mounting bracket assembly.	A-7	To allow full meshing with drive gear on tractor drive shaft without backlash or binding.
6. Drive gear on tractor drive shaft.	A-7	Horizontally aligned with mating gear on mounting bracket assembly.
7. Drive gear on mounting bracket assembly.	A-7 A-9	Horizontally aligned with mating gear on Sheet Feeder.
8. Distance between outboard surface of left collar on rear shaft spacer and inside surface of left frame on mounting bracket assembly.	A-7	1.30 ± .05 in. (3.3 ± .13 cm)
9. Distance of left forms tractor from left side of mounting bracket assembly.	A-8	1/16 in. (1.6 mm)
10. Position of right forms tractor relative to friction feed assembly.	A-8	No clearance.
11. Distance between outside surface of friction rollers on tractor drive shaft and right/left edge of paper.	A-8	1.0 in. (2.5 cm)
12. Position of friction feed assembly relative to left forms tractor.	A-8	No clearance.
13. Sheet Feeder timing belt tension.	A-9	Belt should deflect .2 in. (5.1 mm) when a 5.3 oz. (151 g.) (+25%) force is applied approximately .4 in. (10.2 mm) behind tension roller on the belt span.

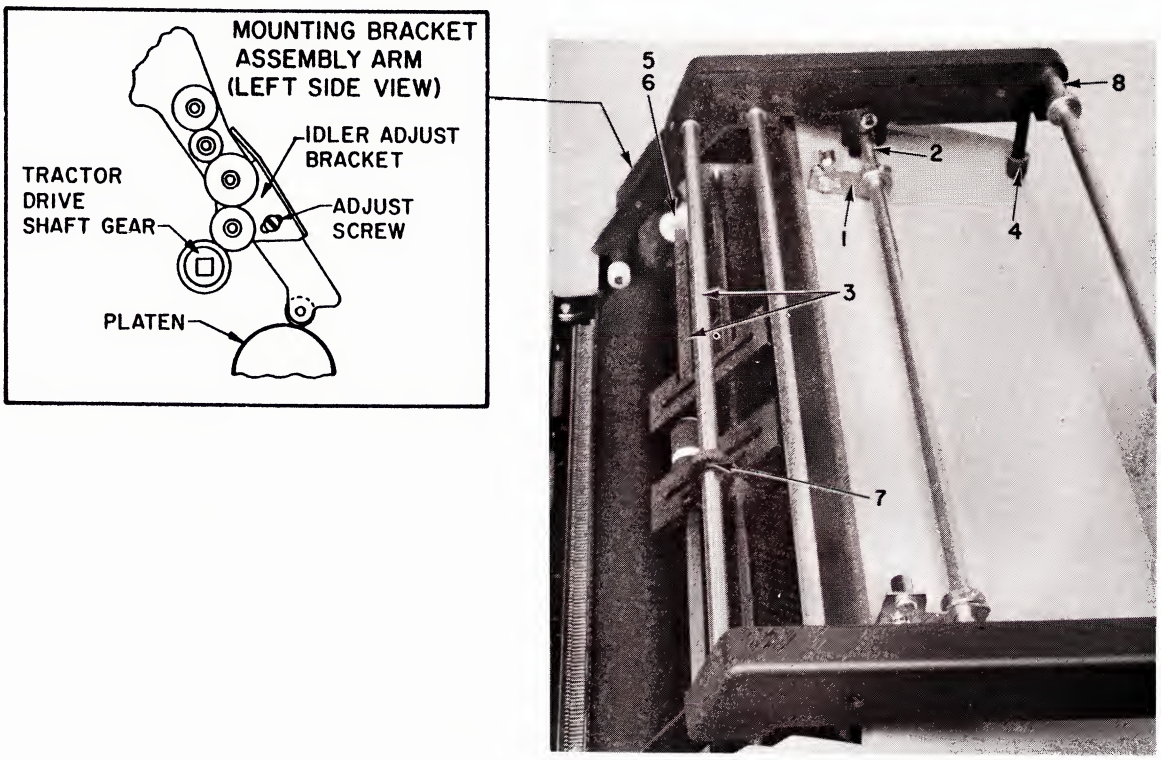

Figure A-7. Adjustment Locations — Top View

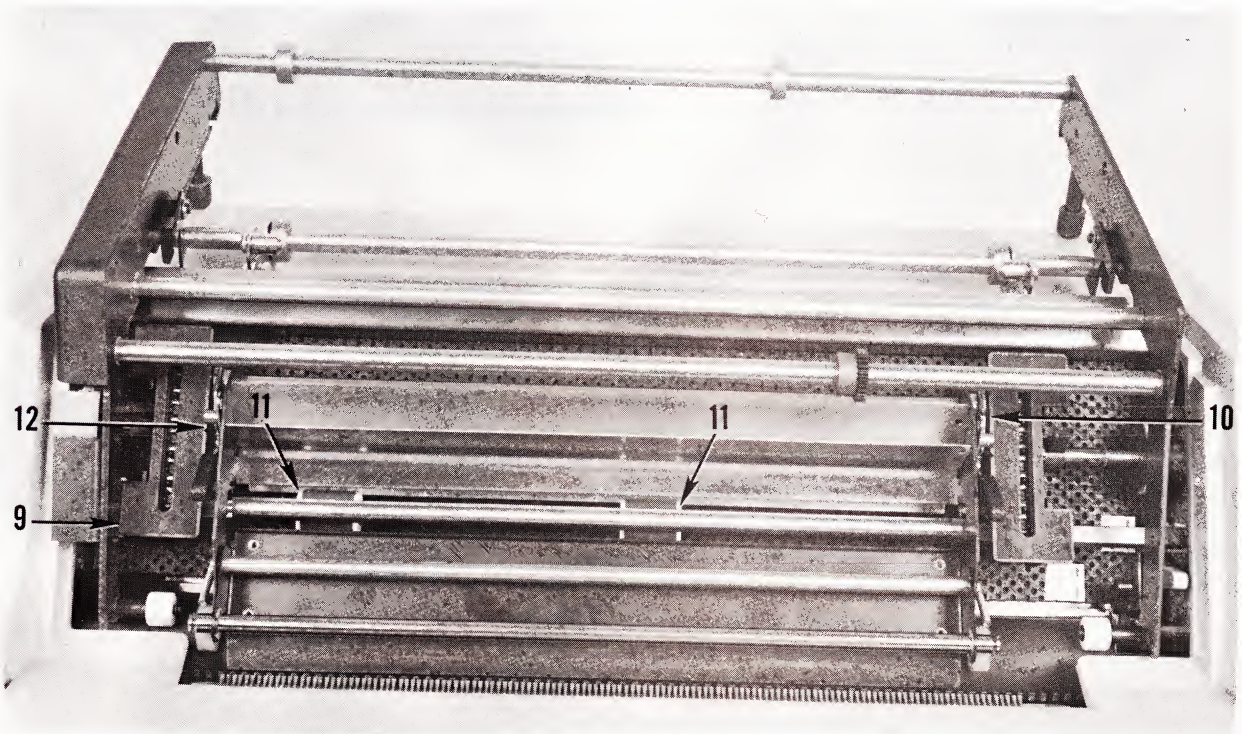

Figure A-8. Adjustment Locations — Front View

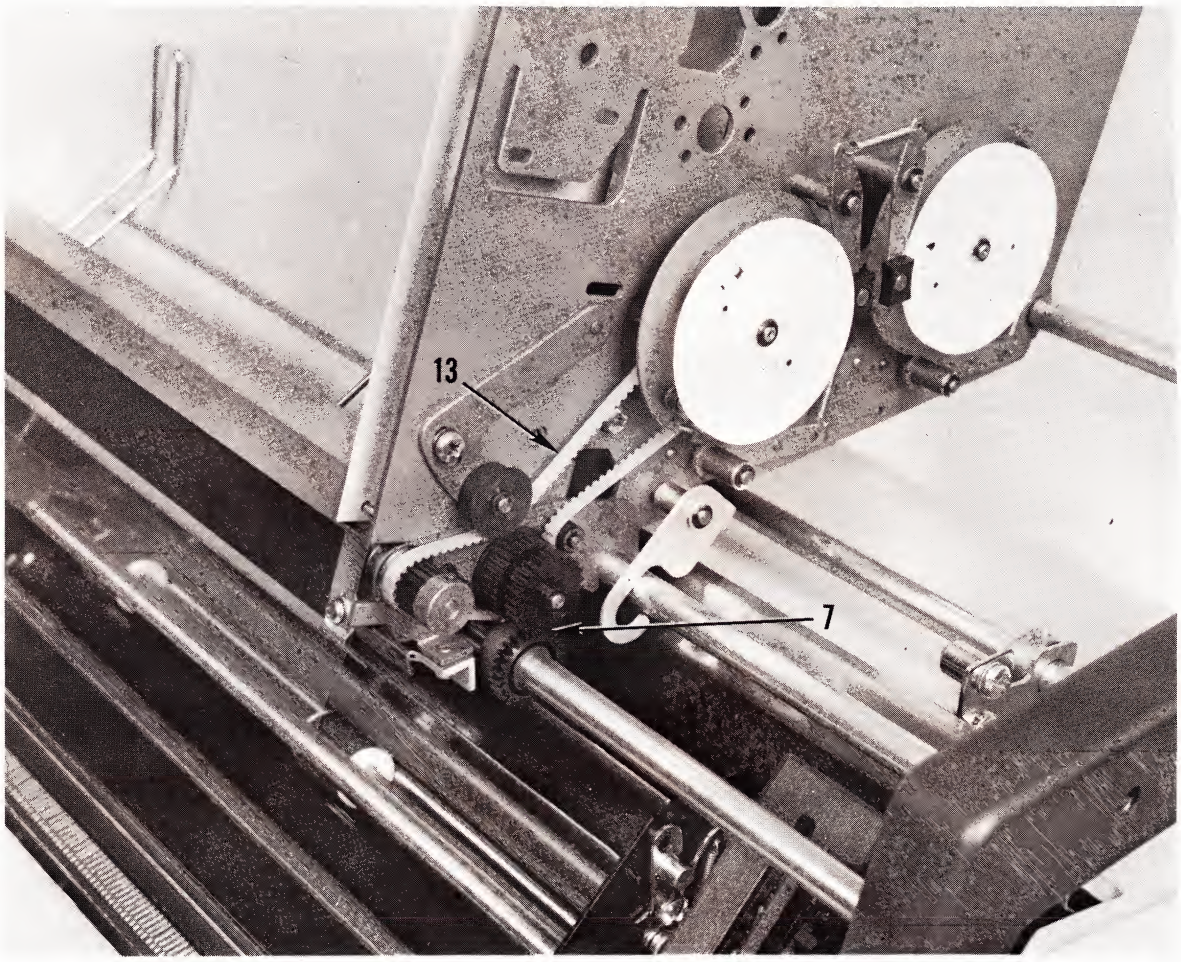

Figure A-9. Adjustment Locations – Side View

TROUBLESHOOTING

Correct installation of the Automatic Sheet Feeder will result in reliable, trouble-free operation. However, if operating problems occur, the "Troubleshooting Guide" below should provide a simple solution to the problem.

NOTE

For fault isolation, it may be helpful to slow the paper feeding speed to 8 in./sec. This is done by connecting TP1 on the RFC board to 0V.

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE
No Power Indication	Fuses (3A) blown on XPS board.
Corresponder Operates, but Appears To Be Slow or Sluggish	One of the two fuses (3A) may be blown on XPS board. (Only ½ of the bridge rectifier will operate with one fuse F4 or F5 blown).
Motor Stops After 1 to 2 Seconds	Internal Alarm condition.
Operation Stops With No Alarm Indication	1. Mounting bracket assembly drive gears binding — idler gear improperly adjusted. 2. Drive belt to tractor drive shaft too tight (see Table 5-1, Adjustments). 3. Tractor drive shaft bearings too tight.
Operation Stops With Alarm Indication	1. Paper out. 2. Ribbon out or broken. 3. Paper jammed.
Sheet Feeder Will Not Select Paper from Paper Tray.	Tray in disengaged position.
Paper Will Not Feed Into Corresponder	1. Paper catches on edge of paper pan due to incorrect adjustment of cosmetic shield. 2. Paper catches on edge of friction feed assembly. Assembly adjusted too far toward right side.
Paper Keeps Jamming and/or Ribbon Keeps Breaking	Bent print finger(s). Correct bent fingers by straightening or replacing them. (Standard spare print fingers kit is available — part number 44A419906-G87).
Paper Does Not Move Up To Desired Printing Location	1. Paper slew character not inserted in the data stream at start of new line. 2. Straps J29 and J31 not installed to allow operation of slew option on HINT or CINT interface boards.
Sheet Feeder Will Not Select Paper Consistently	Spring broken on sheet feeder clutch plate assembly.
Paper Skews to One Side as it Feeds Into the Corresponder	1. Sheet feeder mounting bracket assembly not correctly aligned with frame of Corresponder. 2. Friction feed assembly not latched on one side.
False Ribbon Out Indication	Tension arm drum roller on ribbon deck plate clogged with ink. Refer to "Cleaning" Instructions for cleaning procedure.
Registration From Sheet-to-Sheet Inconsistent	1. Ink buildup on platen, paper pan rollers, friction rollers or friction feed assembly rollers (see note below). 2. Bearings on ends of friction feed assembly rollers need lubrication. NOTE: Refer to "Cleaning" and "Lubrication" instructions for cleaning and lubrication procedure.
Paper Not Picked Up By Output Hopper and Falls Out	Mounting bracket assembly adjusted too far rearward (see Table A-1, Adjustments).
Sheet Feeder and Mounting Bracket Assembly Vibrates Vertically Emitting a Thumping Sound	Side cover of mounting bracket assembly interfering with top cover of Corresponder preventing gears from fully engaging.

If further troubleshooting should be required, it may be helpful to isolate the trouble by determining whether it is sheet feeder related or Corresponder related. To do this, configure the Corresponder for continuous forms paper, and perform a Corresponder checkout by referring to Chapter 2, Section 2, "Checkout."

PARTS REPLACEMENT – SHEET FEEDER

Procedures are given below for field replacement of the following parts/subassemblies on the Sheet Feeder:

- Brake Lever Set
- Catch Plate and Drive Wheel Assemblies
- Timing Belt
- Transport Roller Shaft
- Pinch Roller Assembly
- Gears
- Pickup Roller Shafts

BRAKE LEVER SET (Figure A-10)

1. Remove E-ring from each lever.
2. Spread levers apart at the upper ends and slide them off their mounting studs.
3. Reinstall brake levers by reversing above order.

NOTE

If brake shoes should become worn, they can be rotated fully around for use on their opposite sides.

CATCH PLATE AND DRIVE WHEEL ASSEMBLIES (Figure A-10)

1. Make an identifying mark on one of the two metal drive wheel assemblies in order to keep them separate. The two plastic catch plates are identical and interchangeable. However, the metal drive wheels must be reinstalled in the same locations as they were originally.
2. Remove brake lever set.
3. Remove E-rings from right ends of pick-up roller shafts.
4. Pull wheel assemblies off pick-up roller shafts.
5. The catch plate and drive wheel can be separated by pulling them apart.
6. Reinstall wheel assemblies by pushing and holding the spring-loaded catch toward the outer edge of the wheel while pushing the plastic catch plate onto the wheel.
7. Install wheel assemblies on pick-up roller shafts in the same order as they were before being removed.
8. After the timing belt is correctly routed around drive wheel assembly gears, push assemblies all the way onto shafts. It may be necessary to slide shafts toward right side to make E-ring grooves accessible.
9. Install E-rings on right ends of pick-up roller shafts to secure wheel assemblies to shafts.
10. Install brake lever set.

TIMING BELT (Figure A-10)

1. Remove brake lever set.
2. Remove catch plate and wheel drive assemblies.
3. When reinstalling timing belt, route as illustrated in Figure A-10.
4. Install catch plate and wheel drive assemblies.
5. Install brake lever set.
6. Adjust timing belt tension (see Table A-1, Adjustments, for procedure).

GEARS (Figure A-10)

1. To remove the double gear wheel, perform the following steps:
   a. Slip timing belt off gears.
   b. Remove E-ring and guide roller from mounting stud at rear of double gear wheel.
   c. Remove E-ring and double gear wheel from mounting stud.

d. When reinstalling double gear wheel, reverse steps a through c.

2. To remove the gear wheel assembly (including one-way clutch), slip timing belt off gears and loosen set screw in wheel assembly. Pull assembly and washer from right end of transport roller shaft. When reinstalling gear wheel assembly, take up shaft end play by sliding shaft toward left side of sheet feeder. Then, install washer and gear wheel assembly by sliding them all the way onto shaft before tightening set screw.

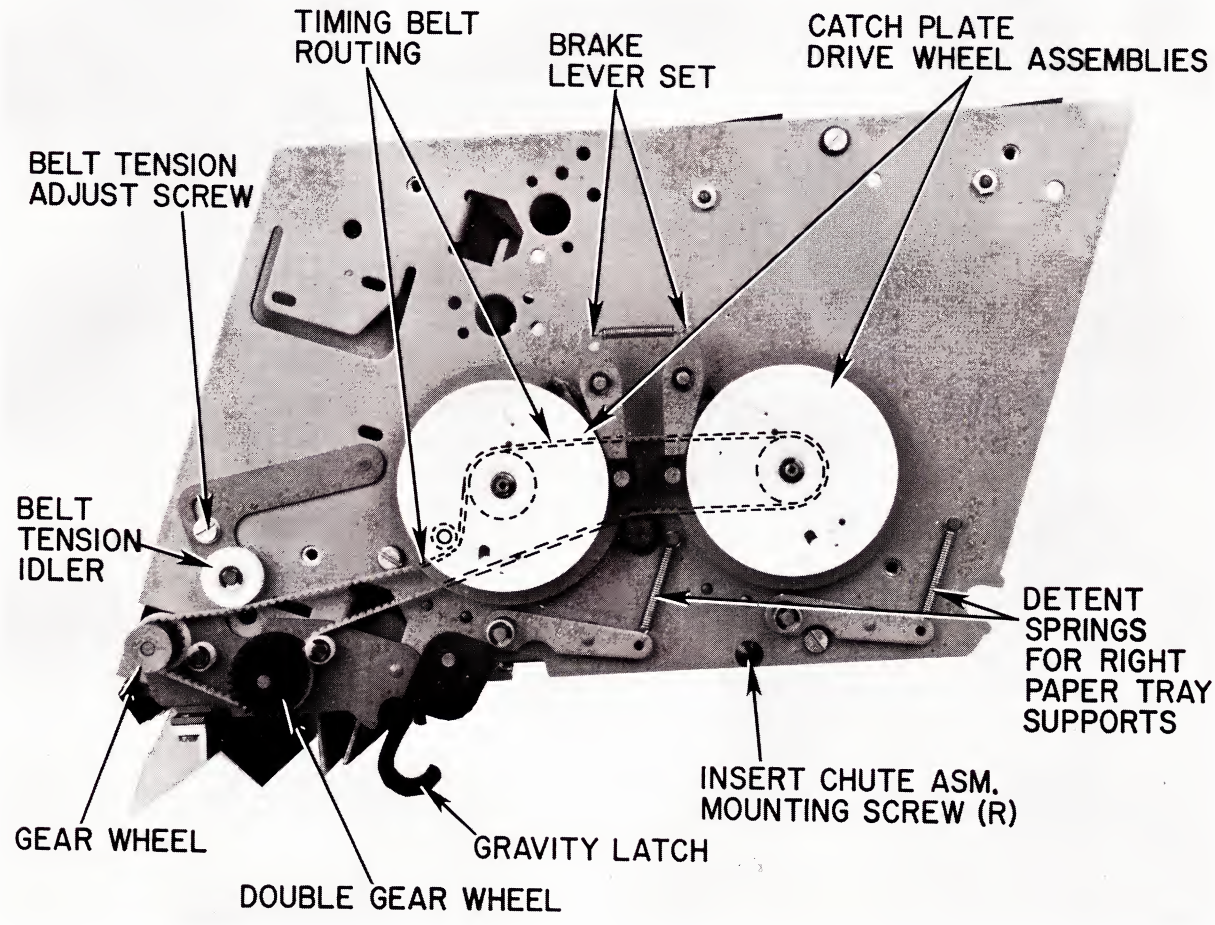

Figure A-10. Sheet Feeder — Left Side View

TRANSPORT ROLLER SHAFT (Figure A-11)

1. Remove output stacker plate and paper holder.

2. Remove front cover assembly by removing the two screws and washers attaching it to the sheet feeder.

3. Remove support plate from left side by removing the two screws attaching it to left side frame.

4. Loosen set screw in gear wheel assembly. Remove gear wheel assembly and washer from shaft.

5. Slide transport roller shaft toward left side of sheet feeder until it is free.

6. Reinstall transport roller shaft by reversing steps 1 through 5.

PINCH ROLLER ASSEMBLY (Figure A-11)

1. Remove the two screws and washers securing paper guide plate and pinch roller assembly to bottom of sheet feeder.
2. Remove paper guide plate and pinch roller assembly.
3. Reinstall paper guide plate and pinch roller assembly by reversing above procedure.

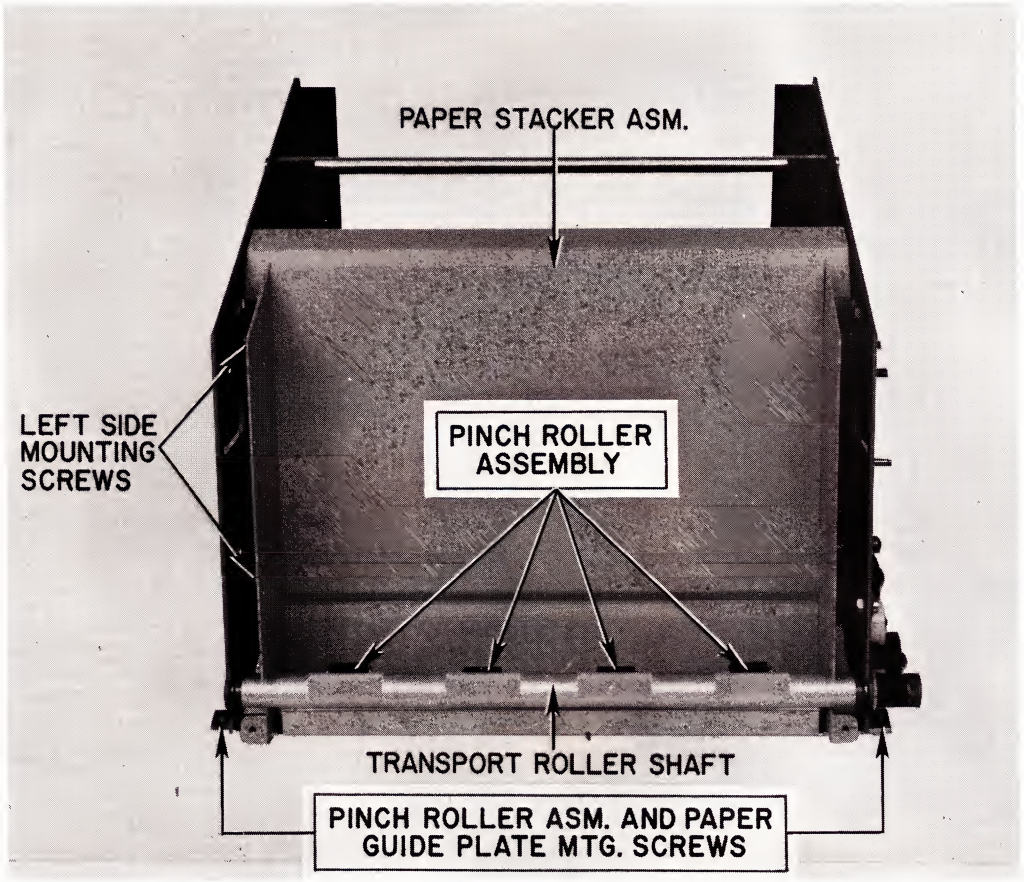

Figure A-11. Sheet Feeder — Front View

PICK-UP ROLLER SHAFTS (Figure A-13)

1. Remove brake lever set (see Figure A-10).
2. Remove catch plate and drive wheel assemblies (see Figure A-10).
3. Remove left mounting screw and washer from paper guide plate (see Figure A-11).
4. Remove right support plate (see Figure A-12).
5. Remove the insert chute assembly from bottom of Sheet Feeder as follows:
   a. Turn sheet feeder over so that bottom side is facing up.
   b. Remove the two slotted, round head screws from each side frame (see Figures A-10 and A-12). These screws secure the insert chute assembly to the side frames.
   c. When the screws are removed, slide insert chute assembly toward rear of sheet feeder until front mounting tabs are free, and left off assembly.
6. Remove the two left mounting screws and washers from front of paper stacker assembly (see Figure A-11).

7. Remove the three screws and washers from left ends of tie rods (see Figure A-12). The left side frame should now be free to remove from sheet feeder.

8. Slide pick-up roller shafts out from right side frame bearings.

9. Install pick-up roller shafts by reversing steps 1 through 8 above.

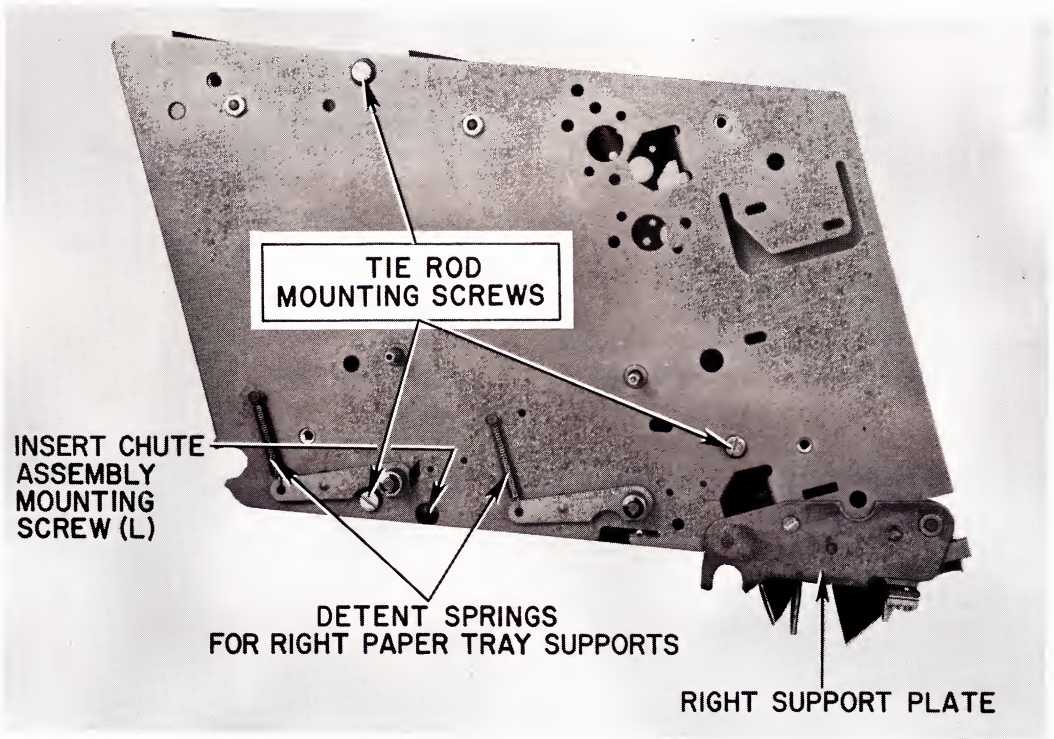

Figure A-12. Sheet Feeder – Right Side View

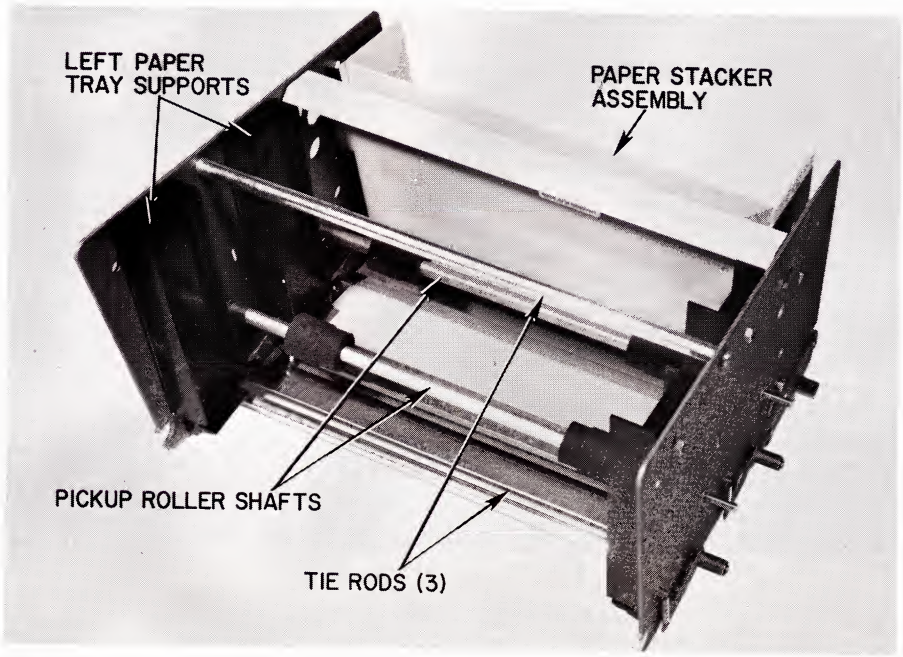

Figure A-13. Sheet Feeder – Top View

PARTS REPLACEMENT – CORRESPONDER

WARNING

DISCONNECT CORRESPONDER FROM THE AC POWER SOURCE BEFORE REMOVING OR REPLACING ANY PARTS.

PAPER OUT SENSOR (Figure A-14)

The paper out sensor is a reflective type photo diode sensor located under the platen. The positioning of the diode socket is accomplished at the factory and no further field adjustment is required. The photo diode can be replaced in the field as follows:

1. Raise top cover.
2. Remove platen.
3. Using a pair of tweezers, remove photo sensing diode as illustrated in Figure A-14.
4. Carefully insert replacement diode.
5. Reinstall platen.
6. Close top cover.

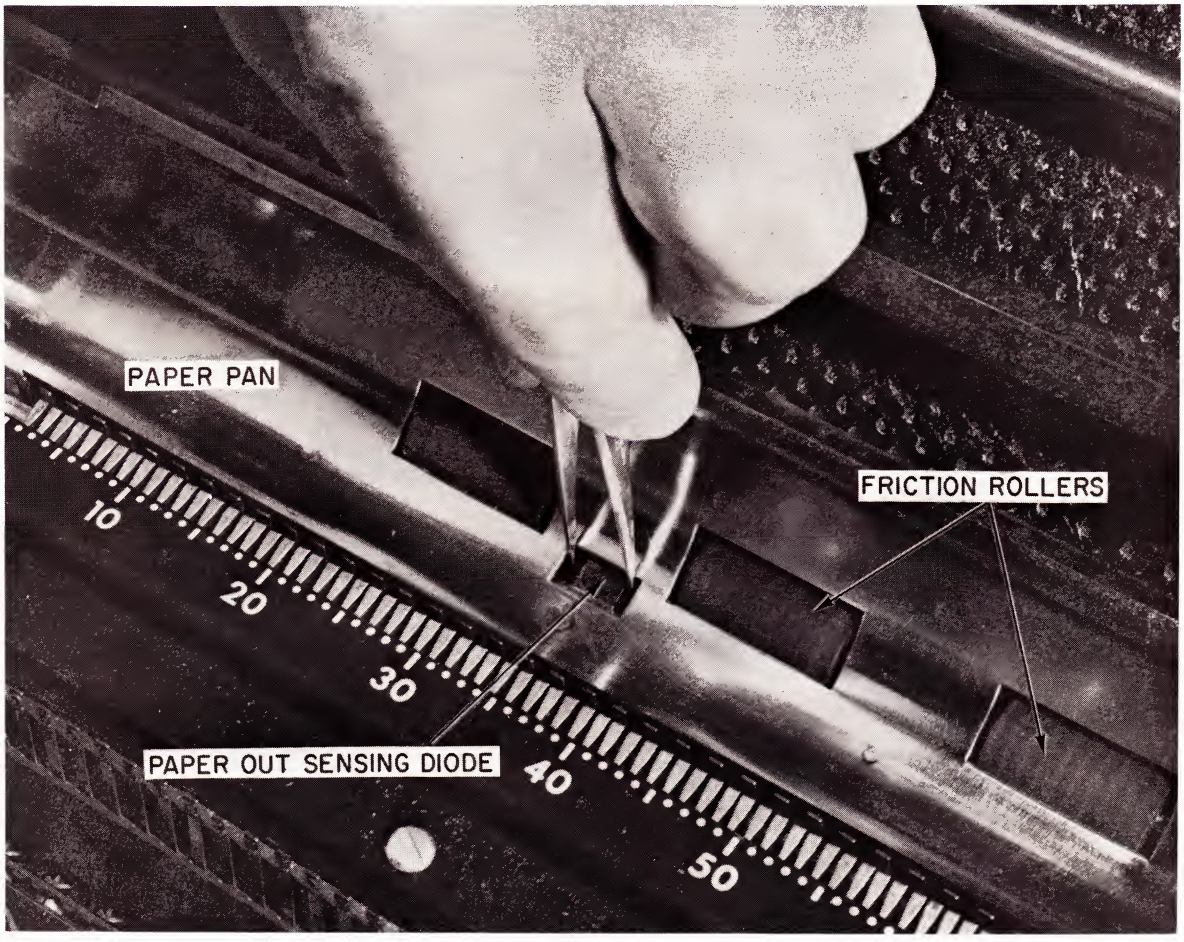

Figure A-14. Removing Photo Sensing Diode

FRICTION FEED SWITCH (Figure A-15)

1. Raise top cover.
2. Remove platen.
3. Remove E-ring from platen latch on each end to gain access to paper pan mounting screws.
4. Remove paper pan mounting screws from each end of paper pan.
5. Disconnect paper pan connector (P42) from connector in wire harness at right side of main frame.
6. Carefully remove paper pan from Corresponder.
7. Mark and remove the three wires from the friction feed switch located under the paper pan on the right end.
8. Remove the two screws securing friction feed switch to paper pan.
9. Reinstall the three wires removed in Step 7 to replacement switch.
10. Install replacement switch to paper pan with the two screws removed in Step 8.
11. Check switch operation. With friction feed lever in "forward" locked position, switch should be past operating point but with enough space to permit over travel (see Figure A-15).
12. Reinstall paper pan by reversing Steps 1 through 6.

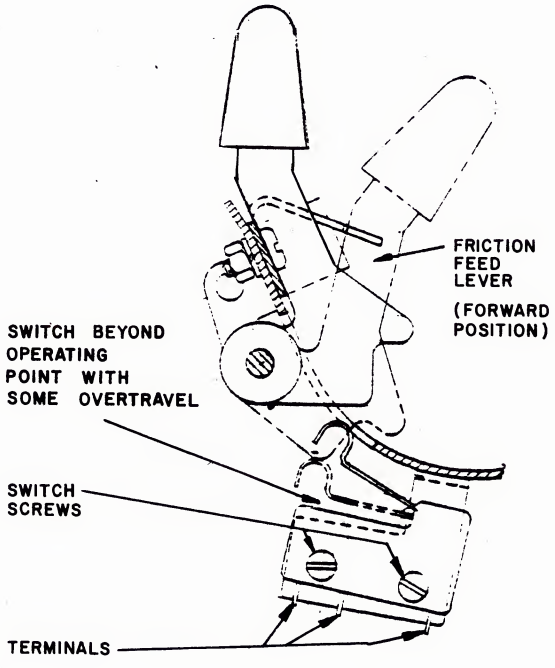

Figure A-15. Friction Feed Lever and Switch

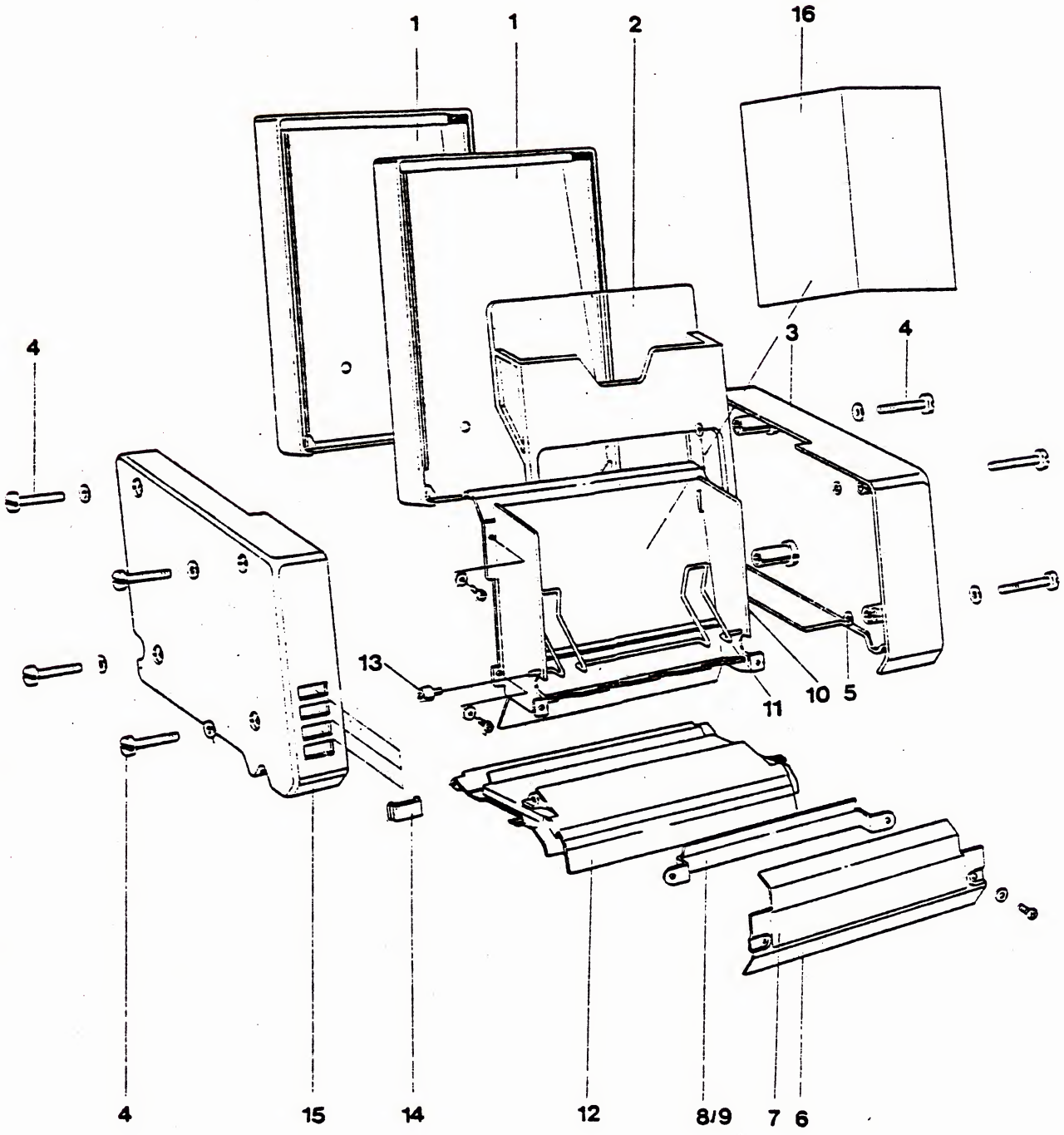

Figure A-16. Cover and Paper Guide

PARTS

Replacement parts for the sheet feeder (44A501653-001) are available from GENICOM Corporation or BDT (MQI Computer Products) at the addresses shown below. Replacement parts not showing a GENICOM part number are available only from BDT. For Corresponder related parts, see Illustrated Parts Manual, GEK-49266. A sheet feeder repair kit is available from GENICOM – Part No. 44A411018-G01.

GENICOM Corporation
One G. E. Drive
Waynesboro, Va. 22980-1999

MQI Computer Products
Division of MQI Corp.
18381 Bandilier Circle
Fountain Valley, CA 92708

COVER AND PAPER GUIDE (Figure A-16)

ITEM	GENICOM PART NO.	BDT PART NO.	QTY.	DESCRIPTION	
1	44A501654-003	280 101 103	1	Paper feed tray	DIN A4
N. I.	44A501654-001	280 101 203	1	Paper feed tray	8½" x 11"
N. I.	44A501654-002	280 101 603	1	Paper feed tray	8½" x 14"
2	44A501656-001	300 010 0009	1	Paper chute	DIN A4
N. I.	44A501656-002	301 010 0009	1	Paper chute	8½" x 11"
3		317 030 0001	1	Right-hand cover	
4		300 010 0078	8	Screw, special	
5		300 010 0143	8	Washer, captive	
6		330 010 0076	1	Front cover assembly	
7		300 010 0177	1	Tape, self sealing	
8		330 010 0220	1	Paper guide plate, assembly (contains Item 9)	
9		330 010 0030	1	Deflector plate	
10		320 010 0003	1	Paper stacker assembly	
11		320 010 0114	1	Paper holder	
12		315 010 0035	1	Insert chute, assembly	
13					
14		318 020 0001	1	Left-hand cover	
15		300 030 0006	4	Shutter cover, black	
16		300 010 0115	1	Output stacker plate, optional	

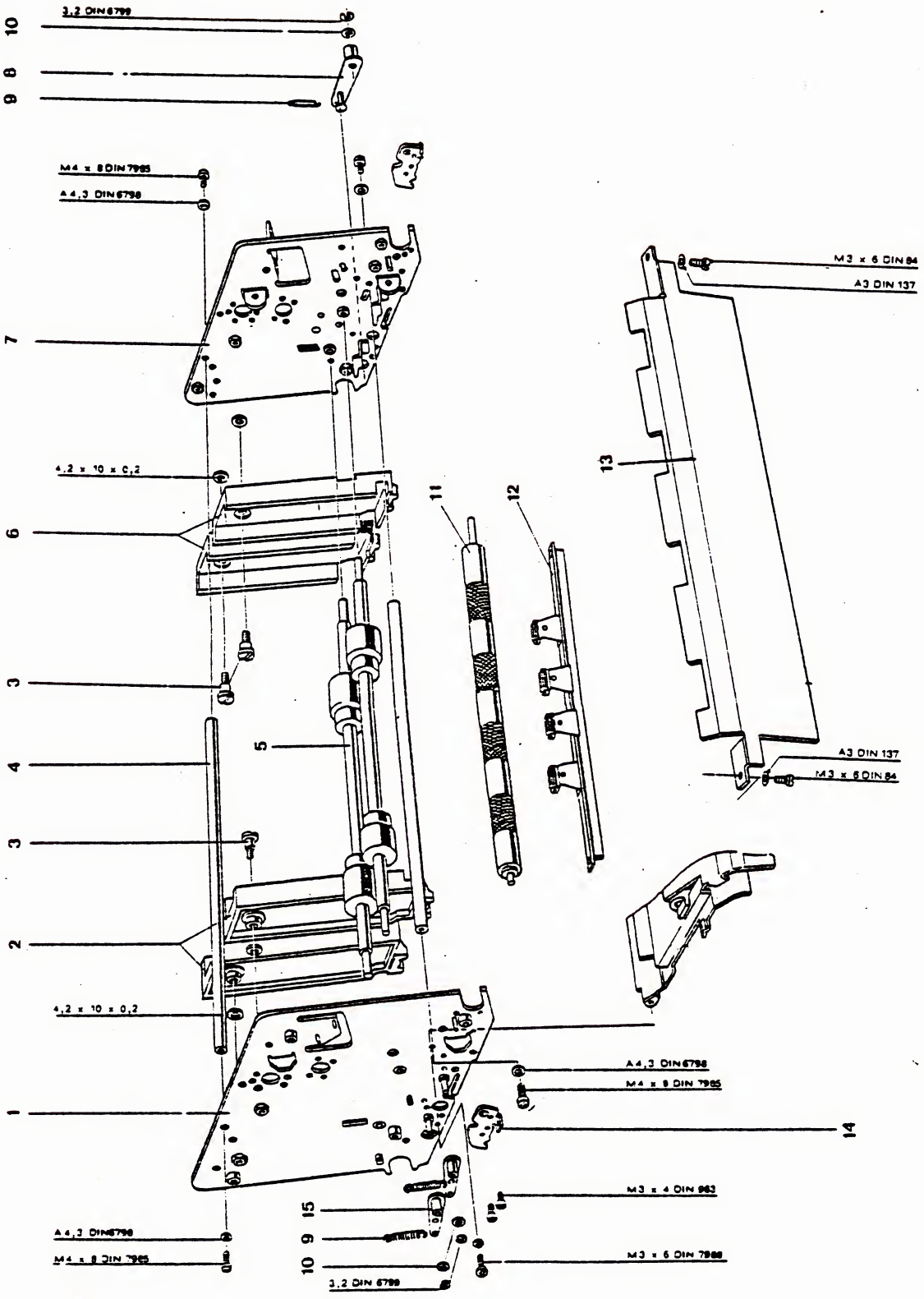

Figure A-17. Paper Feed

PAPER FEED (Figure A-17)

ITEM	GENICOM PART NO.	BDT PART NO.	QTY.	DESCRIPTION
1		318 020 0004	1	Left-hand side frame
2		300 020 0018	2	Feed tray support, left side
3		25 013-005	4	Screw, shoulder
4		300 010 0032	3	Tie rod
5		318 010 0050	2	Pick-up roller shaft
6		300 030 0018	2	Feed tray support, right side
7		318 030 0003	1	Right-hand side frame
8		300 010 0128	2	Locating lever, feed tray support (right)
9		25 501-024	4	Spring, tension
10			a. r.	Washer (4.2 x 8 x 0.2) mms
11		320 010 0065	1	Transport roller shaft, assembly
12		330 010 0122	1	Paper guide plate
13		320 010 0019	1	Pinch roller, assembly
14		330 020 0019	1	Support plate, left side
15		300 010 0029	2	Locating lever, feed tray support (left)

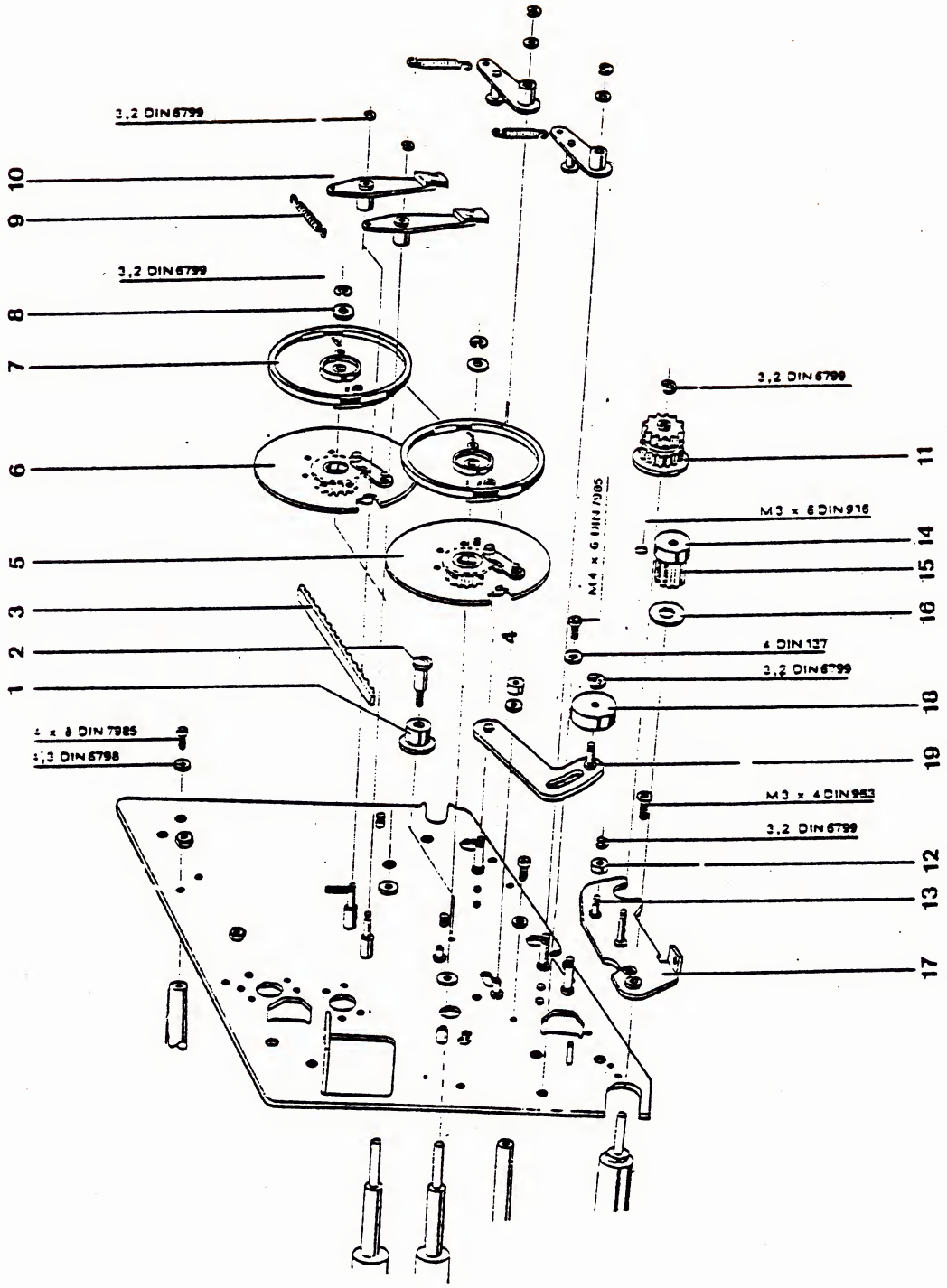

Figure A-18. Right-Hand Side Frame

RIGHT-HAND SIDE FRAME (Figure A-18)

ITEM	GENICOM PART NO.	BDT PART NO.	QTY.	DESCRIPTION
1		25 308-074	1	Guide pulley, timing belt
2		25 013-006	1	Screw, shoulder
3		318 030 0020	1	Timing belt (4T 2.5/480)
4		25 308-065	1	Guide roller, timing belt
5		318 030 0060	1	Drive wheel, coded (selection- and feed unit #1), assembly
6		318 030 0070	1	Drive wheel, coded (selection-and feed unit #2), assembly
7		318 030 0063	2	Catch plate, pick-up roller shaft, assembly
8			a.r.	Washer (4.2 x 8 x 0.5) mms (4.2 x 8 x 0.2) mms (4.2 x 8 x 0.1) mms
9		KE 63 3056	1	Spring, tension
10		318 030 0023	2	Brake lever set
11		318 030 0036	1	Gear wheel, double
12		25 308-062	1	Guide roller, timing belt.
13		318 030 0040	1	Stud, guide roller
14		25 301-100	1	Arbor one-way clutch
15		320 030 0016	1	Gear wheel, assembly (one-way clutch)
16		318 030 0041	1	Guide washer
17		330 030 0020	1	Support plate, right side
18		318 030 0046	1	Tension roller
19		318 030 0044	1	Tension lever
20		330 030 0006	1	Front lift latch

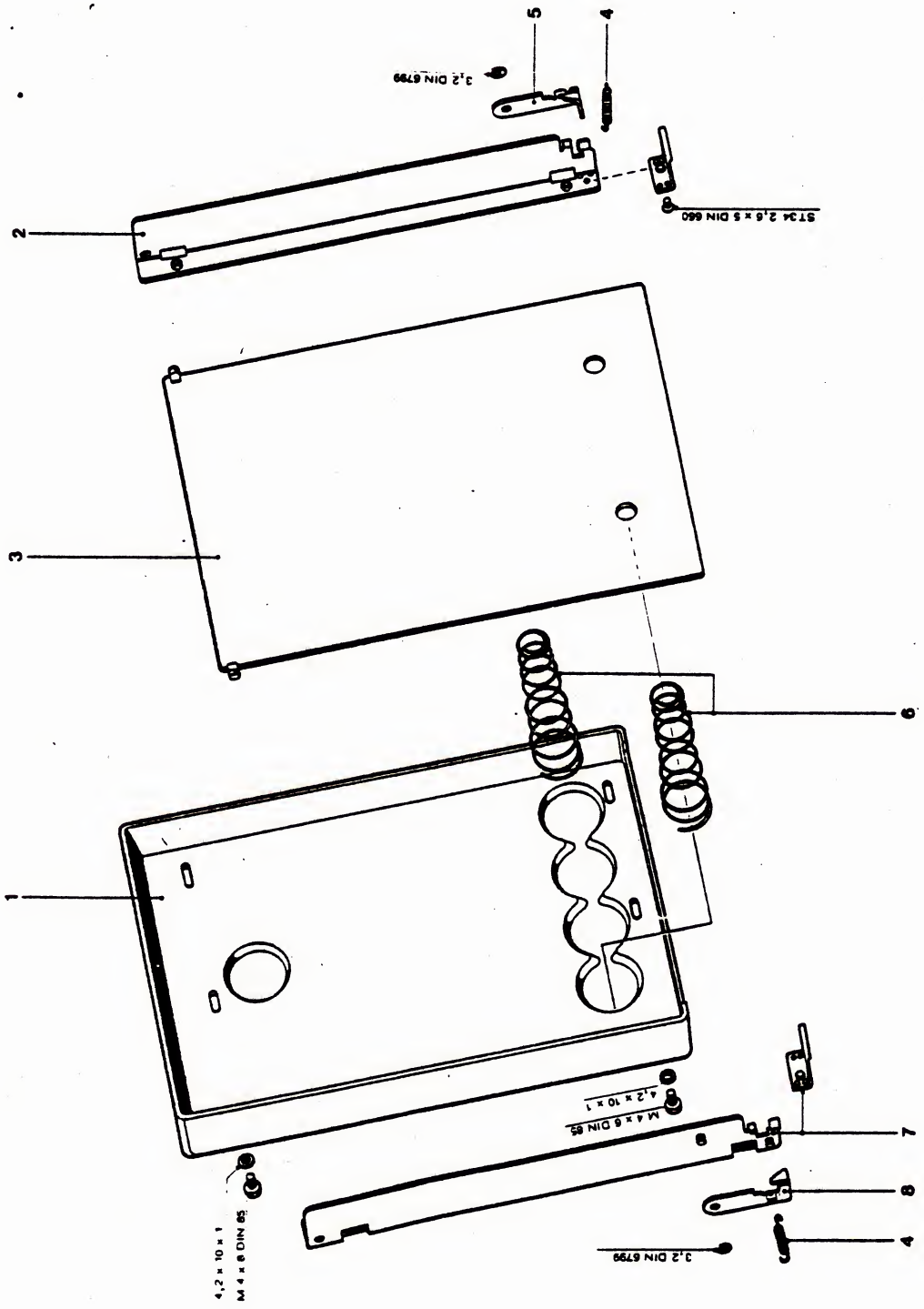

Figure A-19. Paper Feed Tray

PAPER FEED TRAY (Figure A-19)

ITEM	GENICOM PART NO.	BDT PART NO.	QTY.	DESCRIPTION
	44A501654-003	280 101 103	1	Paper feed tray DIN A4 size
1		300 010 0034	1	Shell, feed tray
2		300 010 0040	1	Guide bracket, right side
3		300 010 0035	1	Paper seating plate
4		25 501-011	2	Tension spring, paper retaining arm
5		300 010 0048	1	Paper retaining arm, right side
6		300 010 0041	2	Conical spring
7		300 010 0037	1	Guide bracket, left side
8		300 010 0047	1	Paper retaining arm, left side
	44A501654-001	280 101 203	1	Paper feed tray 8½ x 11" size
1		300 010 0034	1	Shell, feed tray
2		300 010 0040	1	Guide bracket, right side
3		301 010 0035	1	Paper seating plate
4		25 501-011	2	Tension spring, paper retaining arm
5		300 010 0048	1	Paper retaining arm, right side
6		300 010 0041	2	Conical spring
7		300 010 0037	1	Guide bracket, left side
8		300 010 0047	1	Paper retaining arm, left side
	44A501654-002	280 101 603	1	Paper feed tray 8½" x 14" size
1		302 010 0128	1	Shell, feed tray
2		302 010 0128	1	Guide bracket, right side
3		301 010 0035	1	Paper seating plate
4		25 501-011	2	Tension spring, paper retaining arm
5		300 010 0048	1	Paper retaining arm, right side
6		300 010 0041	2	Conical spring
7		302 010 0037	1	Guide bracket, left side
8		300 010 0047	1	Paper retaining arm, left side

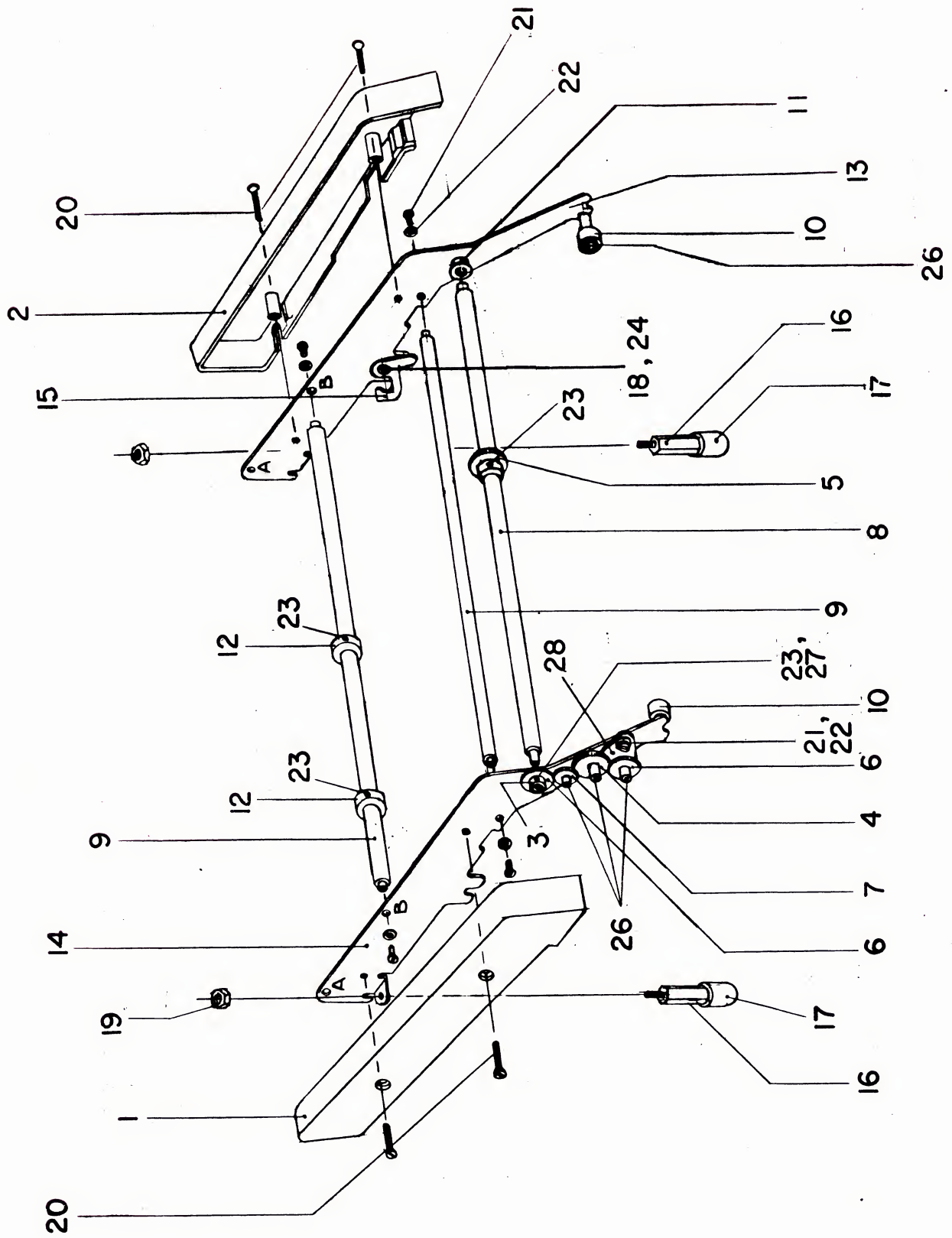

Figure A-20. Mounting Bracket

MOUNTING BRACKET (Figure A-20)

ITEM	GENICOM PART NO.	BDT PART NO.	QTY.	DESCRIPTION
1	44A501655-001	291 046 553	1	Left-hand cover
14	44C415239-G01		1	Left-hand side plate
16	44A503607-001		2	Stand-off
9	44A503644-001	160 310 501	2	Shaft, spacer
12	44A503642-003	160 062 001	2	Set collar
13	44C415239-G02		1	Right-hand side plate
2	44A501655-002	291 046 563	1	Right-hand cover
5	44A417782-008	200 046 503	1	Spur gear assembly
8	44A503645-001	160 309 501	1	Drive shaft
28	44A503616-G01		1	Idler plate assembly
3	44A503642-001	332 100 0009	1	Collar
4	44A417782-005	200 033 501	1	Spur gear
6	44A417782-006	200 034 501	2	Spur gear
7	44A417782-004	200 034 501	1	Spur gear
10	44A503647-001	165 033 501	2	Roller
11	44A501458-011	160 159 501	2	Sleeve bearing
15	44A503602-001		2	Gravity lock
17	44A335881-001		2	Bumper
18	L400P26B91		2	Plain washer
19	L200P14B91	M5 DIN 134	2	Hex nut
20	L11P12020B91	M4X20DIN963	4	Flat head screw
21	L10P12008B91	M4X8DIN85	5	Pan head screw
22	L400P25B91	A4 DIN 137	5	Plain washer
23	L19P10006B91	M3X6 DIN 551	5	Socket head screw
24	L902P5	3, 9 DIN 6799	2	Retaining ring
26	L902P4C	3, 2 DIN 6799	5	Retaining ring
27	A15B41H		1	Loctite

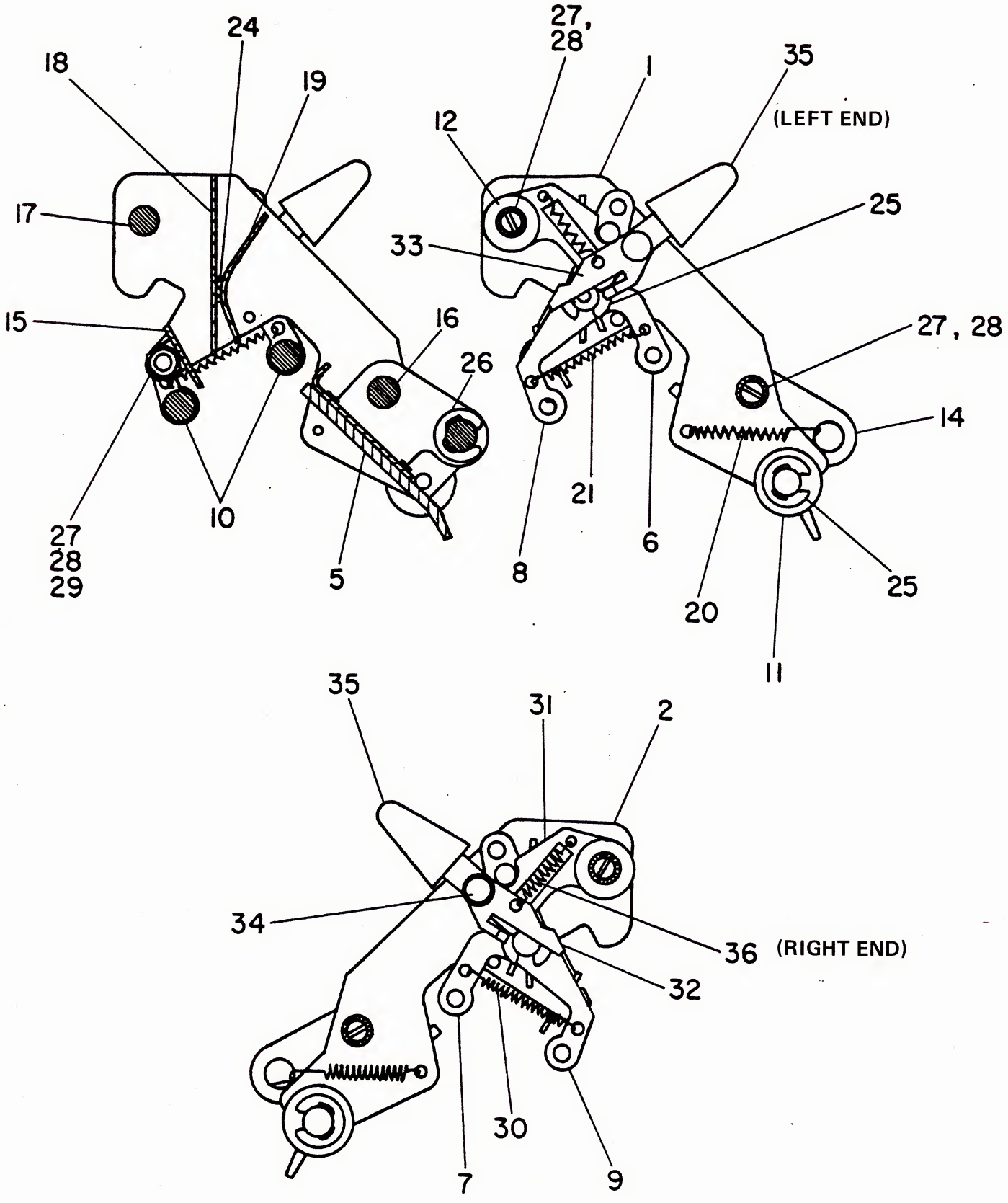

Figure A-21. Friction Feed Assembly

FRICTION FEED ASSEMBLY (Figure A-21)

ITEM	GENICOM PART NO.	BDT PART NO.	QTY.	DESCRIPTION
1	44B503524-G01		1	Frame Assembly, Left
2	44B503524-G02		1	Frame Assembly, Right
5	44B503521-G01		1	Paper Deflector
6	44A503619-G01		1	Rear Arm Assembly, Left
7	44A503619-G02		1	Rear Arm Assembly, Right
8	44A503618-G01		1	Rear Arm Assembly, Left
9	44A503618-G02		1	Rear Arm Assembly, Right
10	44A503617-G01		2	Pressure Platen
11	44A503455-001		2	Adjustment Roller
12	44A503475-001		2	Collar Clamp
N. I.	44A503610-001		2	Spacer (see Note 1)
14	44B503509-001		1	Rod Deflector
15	44B503511-001		1	Tie-Paper Guide
16	44B503515-001		1	Rod
17	44B503516-001		1	Rod
18	44B503517-001		1	Paper Deflector
19	44C415238-001		1	Deflector
20	44A411501-001		2	Spring
21	44A417866-027		1	Extension Spring, Left
N. I.	44A410146-002		2	Shim (.005 in.) (see Note 2)
N. I.	44A410146-004		6	Shim (.010 in.) (see Note 3)
24	44A419858-001		1	Rubber Foam
25	N910P25C		4	Retaining Ring
26	N910P31C		2	Retaining Ring
27	N57P13004C		6	Screw, #6-32 x .25
28	N403P13C		6	Lockwasher, #6
29	N210P13C		2	Nut, #6
30	44A417866-026		1	Extension Spring, Right
31	44B503518-001		2	Cam Lever
32	44A503614-001		1	Pawl-latch, Right
33	44A503614-002		1	Pawl-latch, Left
34	44A503482-001		2	Rivet Latch
35	44B501337-001		2	Knob
36	44A417866-022		2	Extension Spring

NOTES:

(1) Spacer goes between cam lever (Item 31) and side frame (Item 1 or 2).

(2) One .005 in. shim goes between rear arm assembly (Item 6 or 7) and side frame (Item 1 or 2).

(3) Two .010 in. shims go between rear arm assemblies (Items 6 and 8) or (items 7 and 9). Also, one .010 in. shim goes between rear arm assembly (Item 6 or 7) and side frame (Item 1 or 2).

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